VOLUME 56

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Dec. 1956

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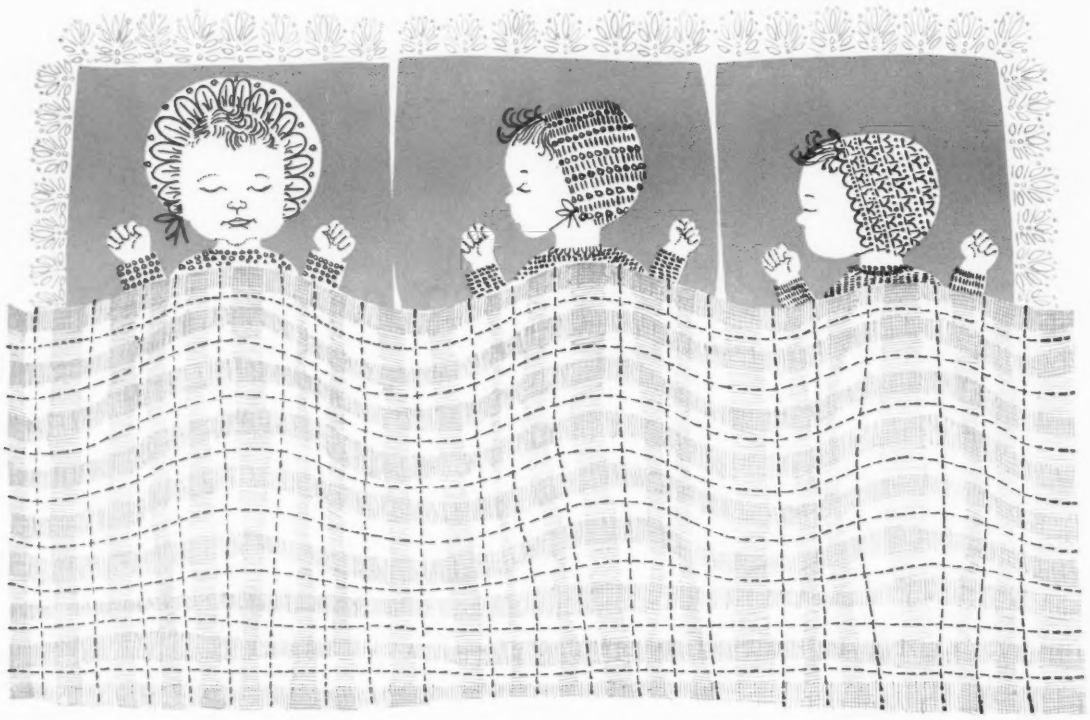

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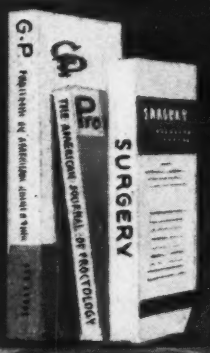

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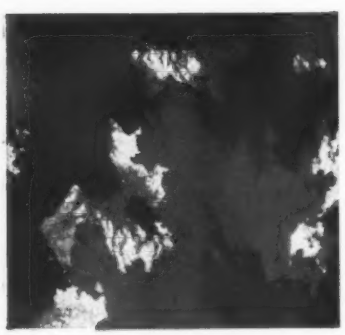

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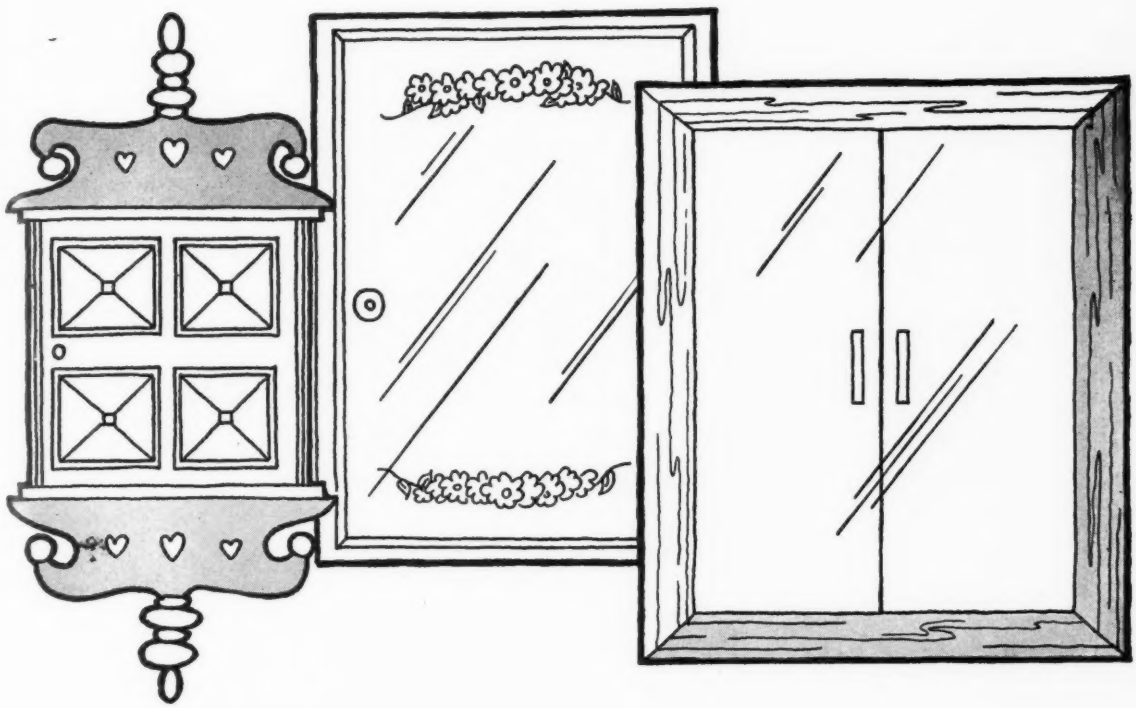

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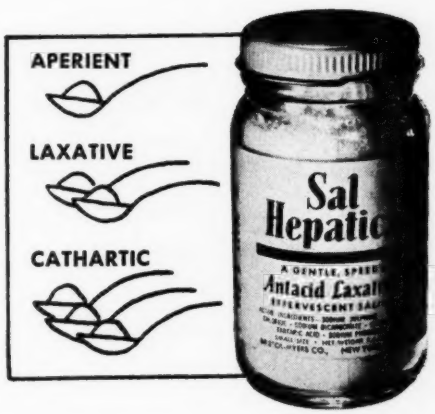

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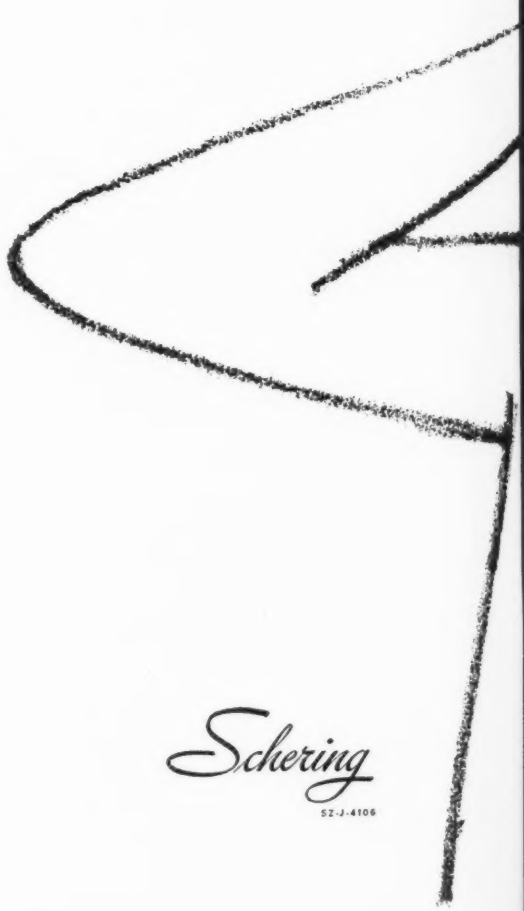

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References: 1. Greenblatt, R. B.: Obst. & Gynec. *2:*530, 1953. 2. Javert, C. T.: Ann. New York Acad. Sc. *61:*700, 1955. 3. Barishaw, S. B.: Exp. Med. Surg. *7:*358, 1949. 4. Selsman, G. J. V. & Horoschak, S.: Am. J. Dig. Dis. *17:*92, 1950.

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a further advance in psychopharmacology

a true "tranquilizer" with specific action in psychic and psychosomatic conditions

indicated in mental and emotional disturbances — mild and moderate — encountered in everyday practice

available in 5 mg. tablets

minimal side effects

Few drugs have been so thoroughly studied before introduction or introduced with such a substantial background of clinical experience.

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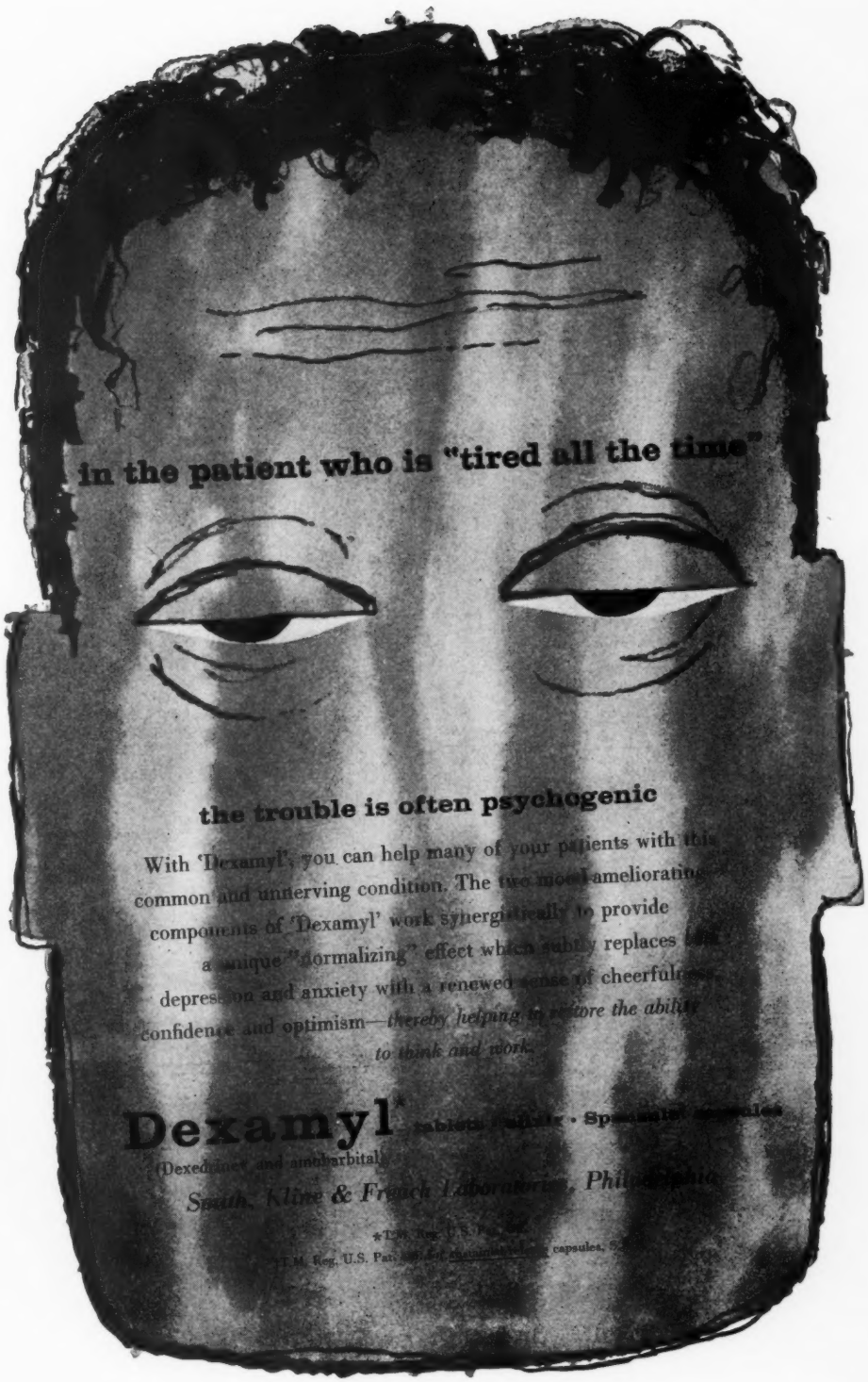
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*Fiskio, P. W.: GP *11*:70 (May) 1955.

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1. Groskloss, H. H. et al: Bonadoxin®: a unique control for nausea and vomiting of pregnancy. Clin. Med. 2:885 (Sept.) 1955. 2. Tartikoff, G.: The antiemetic function of Bonadoxin in the nausea and vomiting of pregnancy. Clin. Med. 3:223 (Mar.) 1956.

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in a single tablet —

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For controlling cough

ROMILAR IS AT LEAST AS EFFECTIVE AS CODEINE

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In addition to its gentle antihypertensive action, Rauwiloid provides psychic tranquility and overcomes tachycardia. Thus Rauwiloid participates in *both* the somatic and psychic phases of therapy for hypertension. Treatment in *all* types of hypertension may begin with Rauwiloid. 80% of mild labile hypertensives require no additional therapy. Dosage is definite and easy: two 2 mg. tablets at bedtime.

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relaxes both mind and muscle

for the average patient in everyday practice

- well suited for prolonged therapy
- well tolerated, nonaddictive, essentially nontoxic
- no blood dyscrasias, liver toxicity, Parkinson-like syndrome or nasal stuffiness
- chemically unrelated to chlorpromazine or reserpine
- does not produce significant depression
- orally effective within 30 minutes for a period of 6 hours

Indications: **anxiety and tension states, muscle spasm.**

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Tranquilizer with muscle-relaxant action

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2-methyl-2-n-propyl-1,3-propanediol dicarbamate—U.S. Patent 2,724,720

SUPPLIED: *400 mg. scored tablets. Usual dose: 1 or 2 tablets t.i.d.*

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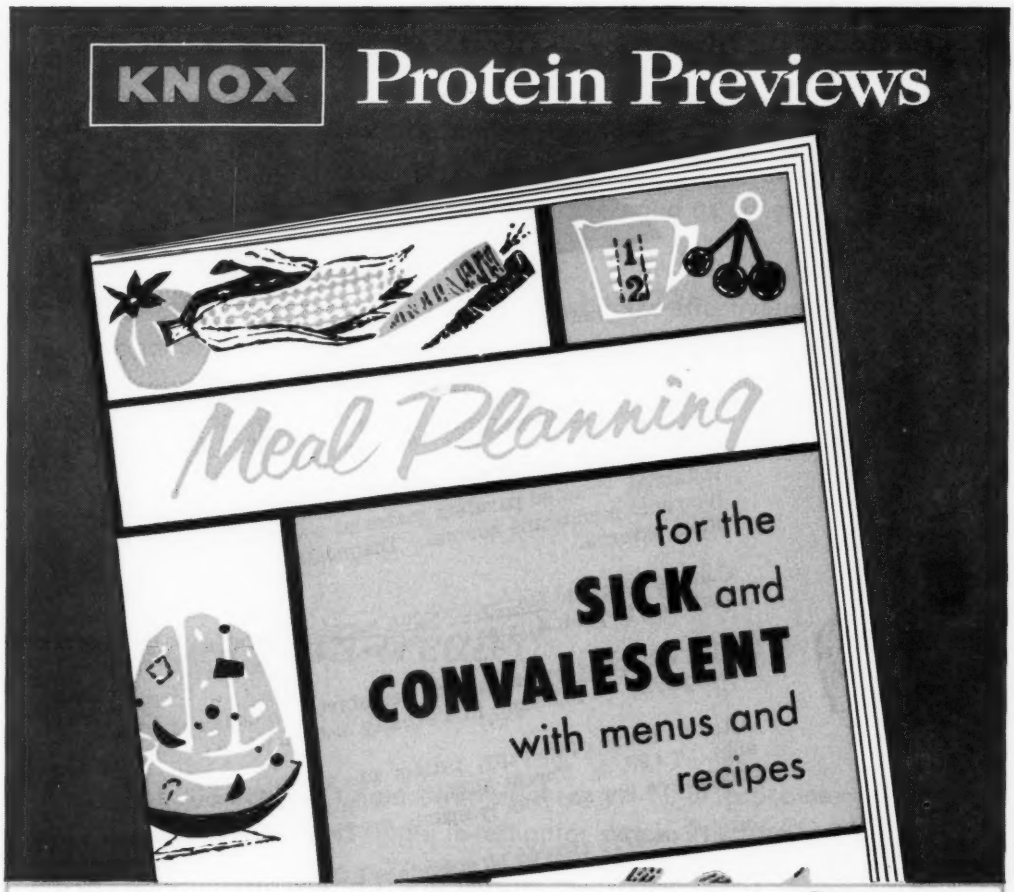

New Booklet Presents Latest Facts on Feeding the Sick

Adequate nutrition during illness and convalescence is essential for recovery whether the patient is managed in the hospital or at home. In the latter case, physicians often must devote much time to instructing those responsible for caring for the sick in good nutritional practices.

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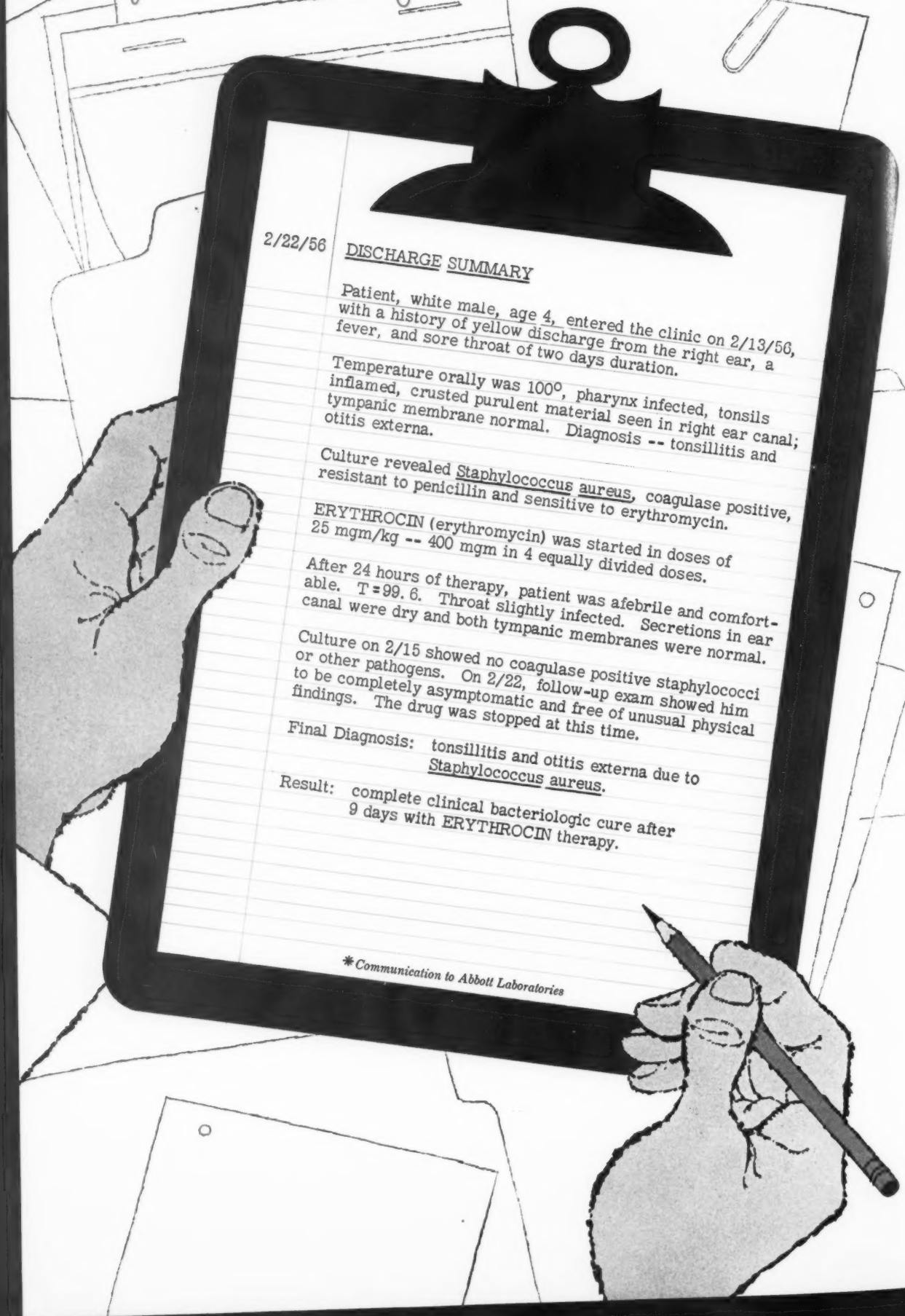
Please send me.....copies of the new **Knox** "Sick and Convalescent" booklet.

YOUR NAME AND ADDRESS

Erythrocin in treating tonsillitis and otitis externa*



2/22/56 DISCHARGE SUMMARY

Patient, white male, age 4, entered the clinic on 2/13/56, with a history of yellow discharge from the right ear, a fever, and sore throat of two days duration.

Temperature orally was 100°, pharynx infected, tonsils inflamed, crusted purulent material seen in right ear canal; tympanic membrane normal. Diagnosis -- tonsillitis and otitis externa.

Culture revealed Staphylococcus aureus, coagulase positive, resistant to penicillin and sensitive to erythromycin.

ERYTHROCIN (erythromycin) was started in doses of 25 mgm/kg -- 400 mgm in 4 equally divided doses.

After 24 hours of therapy, patient was afebrile and comfortable. T = 99.6. Throat slightly infected. Secretions in ear canal were dry and both tympanic membranes were normal.

Culture on 2/15 showed no coagulase positive staphylococci or other pathogens. On 2/22, follow-up exam showed him to be completely asymptomatic and free of unusual physical findings. The drug was stopped at this time.

Final Diagnosis: tonsillitis and otitis externa due to Staphylococcus aureus.

Result: complete clinical bacteriologic cure after 9 days with ERYTHROCIN therapy.

*Communication to Abbott Laboratories

"clinical response good or excellent"

In one recent study, 18 patients with acute follicular tonsillitis and septic sore throat, were given erythromycin. Infecting organism was *Str. pyogenes*. The investigator stated, "*In all 18, the clinical response could be regarded as either good or excellent.*"[1]

This, of course, is only one of many reports showing the effectiveness of ERYTHROCIN against coccic infections. You'll get the same good results (nearly 100% in common, bacterial respiratory infections) when your prescription reads *Filmtab* ERYTHROCIN Stearate.

"toxicity lower in erythromycin-treated patients"

After a study of 208 patients treated with erythromycin (78), procaine penicillin (78) and a placebo (52), the investigator stated: "*. . . the incidence of toxicity* (compared to procaine penicillin) *was significantly lower in the erythromycin-treated patients.*"[1]

Actually, ERYTHROCIN stands on a remarkable record of safety. After four years, there's not a single report of a severe or fatal reaction attributable to erythromycin. Also, allergic reactions rarely occur. *Filmtab* ERYTHROCIN Stearate (100 and 250 mg.), is available in bottles of 25 and 100, at all pharmacies.

Abbott

® Filmtab—Film sealed tablets, Abbott; pat. applied for.

1. Herrell, W. E., Erythromycin, Antibiotics Monographs, No. 1, p. 29, New York, Medical Encyclopedia, Inc., 1955.
Idem p. 30.

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Erythrocin® STEARATE

(Erythromycin Stearate, Abbott)

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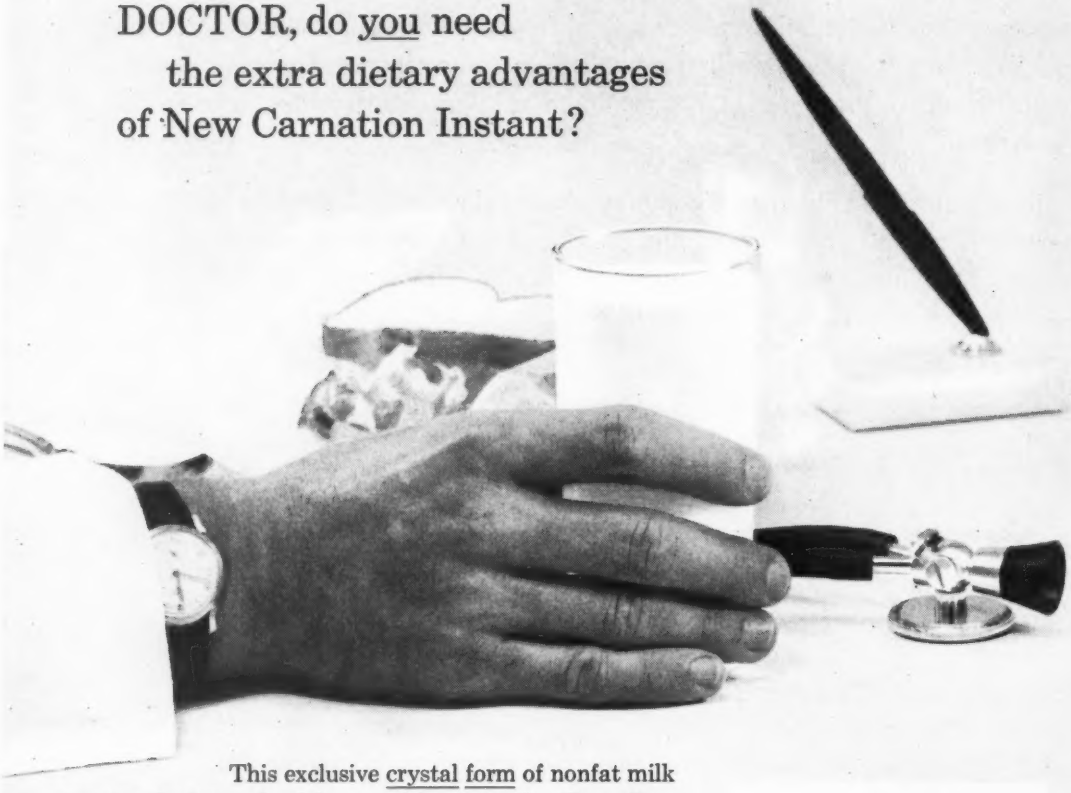
DOCTOR, do you need the extra dietary advantages of New Carnation Instant?



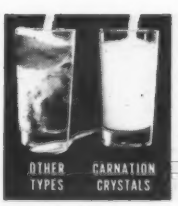
This exclusive crystal form of nonfat milk can give the busy physician a quick, protective "boost" no other form of milk can match – and it tastes so good!

Many a physician who has suggested new Carnation Instant for various low-fat, low-calorie diets hasn't considered what this crystals milk discovery can do for him.

Carnation Instant fits into your busiest professional day. These remarkable crystals burst into delicious, fresh flavor nonfat milk instantly, even in ice-cold water. Ready to enjoy, delicious for drinking, in any moment you can snatch.

Yet, the most interesting dietary and flavor advantage over bottled nonfat milk is Carnation Instant "self-enrichment." You simply add an extra tablespoon of crystals per glass for far richer flavor and a 25% increase in milk protein, minerals and B-vitamins. Your patients who "resist" ordinary nonfat milk will enjoy self-enriched Carnation Instant. So will you.

Other superiorities of the Carnation *Crystals* Instant



MIXES INSTANTLY
Carnation Instant crystals mix instantly and completely in ice-cold water with a light stir. Powder types do not.

STAYS FRESH
Carnation crystals do not require refrigeration. Do not cake or harden in humid weather. Stays fresh and free-flowing.

HANDY, ECONOMICAL
Always handy for drinking, for cooking (no special recipes needed). Economical, available everywhere in 3 and 8-qt. sizes.

In Constipation
NEW CONFIRMING CLINICAL RESEARCH

"...dioctyl sodium sulfosuccinate [Doxinate] results in restoration of normal function both in terms of stool consistency and frequency."

—CASS, L.J., AND FREDERIK, W.S.: AM. J. GASTROENTEROL. (DEC.) 1956.

"Our results indicate that effective fecal softening is generally adequate to permit correction of chronic constipation of the spastic type."

—FRIEDMAN, M.: AM. PRACT. & DIGEST OF TREATMENT (OCT.) 1956.

"In the atonic group... the simultaneous use of mild laxation [Doxinate with Danthron]...is preferred...."

—FRIEDMAN, M.: AM. PRACT. & DIGEST OF TREATMENT (OCT.) 1956.

DOXINATE®
WITH
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PATENT PENDING

PARTICULAR CONDITIONS FOR DOXINATE THERAPY

- Spastic Constipation
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DOXINATE® WITH DANTHRON IS FREQUENTLY PREFERRED IN:

- Atonic Constipation
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DOXINATE®
(DIOCTYL SODIUM SULFOSUCCINATE, **LLOYD**)

THE ORIGINAL DIOCTYL SODIUM SULFOSUCCINATE FOR TREATING CONSTIPATION

DOSAGE:

ADULTS—2 or 3 soft gelatin green 60 mg. capsules daily.

INFANTS—1 or 2 cc. Doxinate Solution 5% once daily in milk, formula or fruit juice.

Danthron (1,8-dihydroxyanthraquinone) is a mild, peristaltic stimulant acting only on the large bowel.

DOSAGE:

For adults and children over 12—one or two soft gelatin brown capsules (containing Doxinate, 60 mg.; Danthron, 50 mg.) at bedtime for 2 or 3 days or until bowel movements are satisfactory.

LLOYD BROTHERS, INC. • CINCINNATI 3, OHIO

"In the interest of medicine since 1870"

NEW

For Pain-Free

of everyday

In "Rheumatism"*

M*ultiple*

TEMP

combine:

THE PROPER FORMULA
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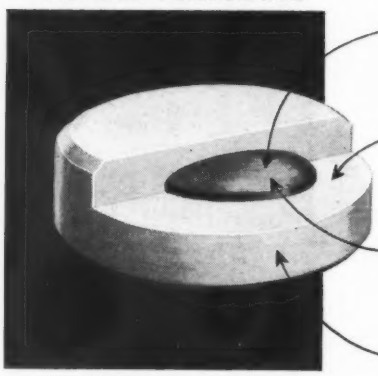

PREDNISOLONE (*1 mg.*)

+

ASPIRIN (*0.3 Gm.*)

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ASCORBIC ACID (*50 mg.*)

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ANTACID (*0.2 Gm.*)

Physical separation of the steroid component from the aluminum hydroxide as provided by the Multiple Compressed Tablet construction assures full potency and stability of prednisolone.

*Early rheumatoid arthritis
Rheumatoid spondylitis
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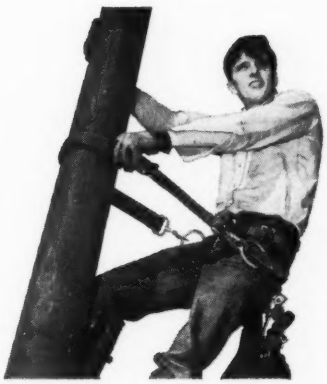

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TEMPOGEN®

..... for anti-inflammatory, anti-rheumatic benefits *at effective low dosage.*

..... for analgesia plus additional anti-rheumatic activity.

..... for anti-stress support that guards against adrenal ascorbic acid depletion.
(Ascorbic Acid present as 60 mg. Sodium Ascorbate.)

..... dried aluminum hydroxide gel minimizes the possibility of gastric distress.

DOSAGE: *1-4 TEMPOGEN Tablets t.i.d. or q.i.d. (TEMPOGEN Forte, 1 or 2 tablets t.i.d. or q.i.d.) for one or two weeks. Then lower by 1 tablet every four or five days to maintenance level.*

SUPPLIED: *TEMPOGEN and TEMPOGEN Forte —in bottles of 100 Multiple Compressed Tablets. (TEMPOGEN Forte provides 2 mg. of prednisolone.)*

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Our "Southwind" Anesthesia unit comes to you complete—ready to use. There is nothing else to buy. Lightweight, portable.

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* Not explosion-proof.

609 COLLEGE ST. Wocher's CINCINNATI 2, O.

Direct, fast relief of gi and pain[1]: Bentyl

gi sp sm

Relieves the pain where it hurts: the gut

2 caps t.i.d.

1. Hardin, J. H.; Levy, J. S., and Seager, L.: South. M. J. 47:1190, 1954.

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1929 . . . a great year for 50 million storks . . .

Unlike most Americans, storks and their cargo struck it lucky in 1929.

Up till then, the joyous news of the safe arrival was frequently, and immediately, drowned out by the clamorous cries of the hungry, colicky baby who couldn't tolerate the food the brand-new world offered.

But in 1929, medical research discovered an ideal solution to infant feeding problems—evaporated milk.

Since then, more than 50,000,000 babies have made sure, steady, healthy growth on evaporated milk formula. Since then, storks haven't had a worry in the world . . .

And no other type of bottle feeding combines all evaporated milk's advantages—the higher protein level necessary to duplicate the growth effect of human milk protein . . . flexibility . . . maximum nutritional value . . . maximum economy.

PET EVAPORATED MILK
is the "going home" formula for more babies than any other form of milk.

PET MILK COMPANY, ARCADE BUILDING, ST. LOUIS 1, MISSOURI

Report | from Carnation Research Laboratory

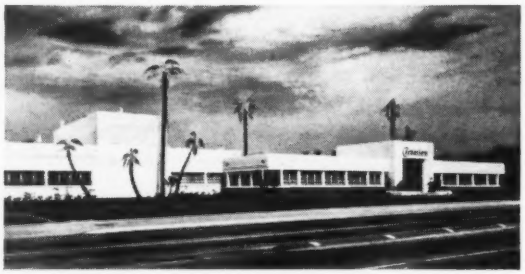
Van Nuys, California

5-Phase Research

For a half-century, Carnation has conducted a continuous and expanding 5-phase research program in dairy and cereal products.

1. CARNATION FARMS

More than fifty years of scientific cattle breeding at Carnation Farms have resulted in many famous Holstein champions. Cattle from these famous bloodlines are shipped to dairy farms across the country to help improve the Carnation milk supply.



2. CARNATION RESEARCH LABORATORY

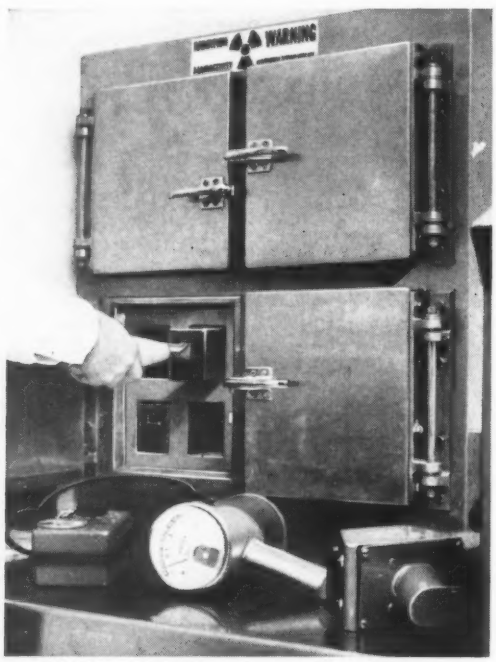
Newest research facility is the Carnation Research Laboratory at Van Nuys, California, shown above – one of America's most modern laboratories devoted to product research. In addition to direct research in dairy and cereal foods, Carnation Laboratory coordinates the other phases of Carnation Research.

3. QUALITY CONTROL RESEARCH

Laboratories at each Carnation Plant exercise rigid day-by-day control of Carnation Milk processing. Samples from *all* Carnation plants are rechecked at Central Product Control, Oconomowoc, Wisconsin, to assure *uniform* high quality of Carnation Milk everywhere.

4. SPONSORED ASSOCIATION RESEARCH

As a member of the National Research Council, Evaporated Milk Association, National Dairy Council, American Dry Milk Institute and many other similar organizations throughout the world, Carnation contributes importantly to the broad research activities conducted by these groups.



5. SPONSORED UNIVERSITY RESEARCH

Carnation sponsors University research in highly specialized fields, such as radiation and supersonic vibration, as related to dairy foods. Current projects are under way at the California and Massachusetts Institutes of Technology and the Universities of Wisconsin and Illinois.

CARNATION PROTECTS YOUR RECOMMENDATION WITH CONTINUOUS 5-PHASE RESEARCH:

Carnation Farms,
Carnation Research Laboratory,
Carnation Plant Laboratories,
Carnation Central Product Control Laboratory,
Carnation-sponsored University and Association Research.

"from Contented Cows"

restrict cold complications . . .

relieve the patient

CORICIDIN with Penicillin

(150,000 units Penicillin G Procaine) **TABLETS**

especially in severe, persistent colds
unsurpassed symptomatic relief simultaneously with antibacterial protection...to ward off common complications such as bronchitis and laryngitis...to help shorten recovery period.

CORICIDIN,® brand of analgesic-antipyretic.

CN-J-14108

a new maximum
in therapeutic
effectiveness

a new maximum
in protection
against
resistance

a new maximum
in safety and
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for
your
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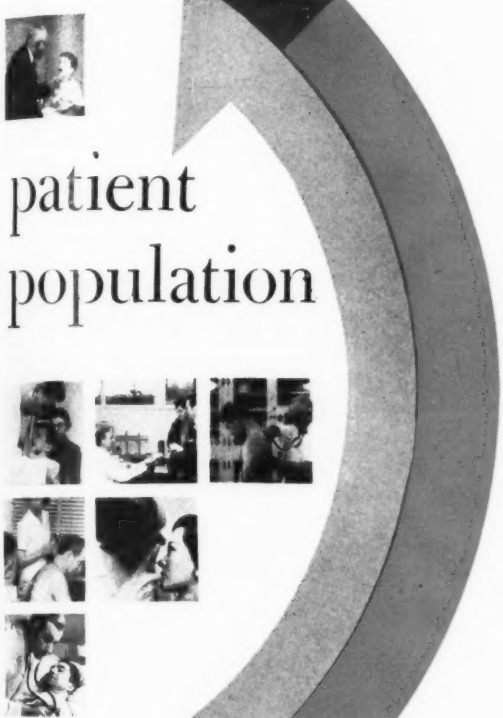

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a new certainty

in antibiotic therapy, particularly for the 90% of patients treated at home and in the office

Superior control of infectious diseases through superior control of the changing microbial population is now available in a new formulation of tetracycline, outstanding broad-spectrum antibiotic, with oleandomycin, Pfizer-discovered new antimicrobial agent which controls resistant strains. The synergistic combination now brings to antibiotic therapy: (1) a new fuller antimicrobial spectrum which includes even "resistant" staphylococci; (2) new superior protection against emergence of new resistant strains; (3) new superior safety and toleration.

*TRADEMARK

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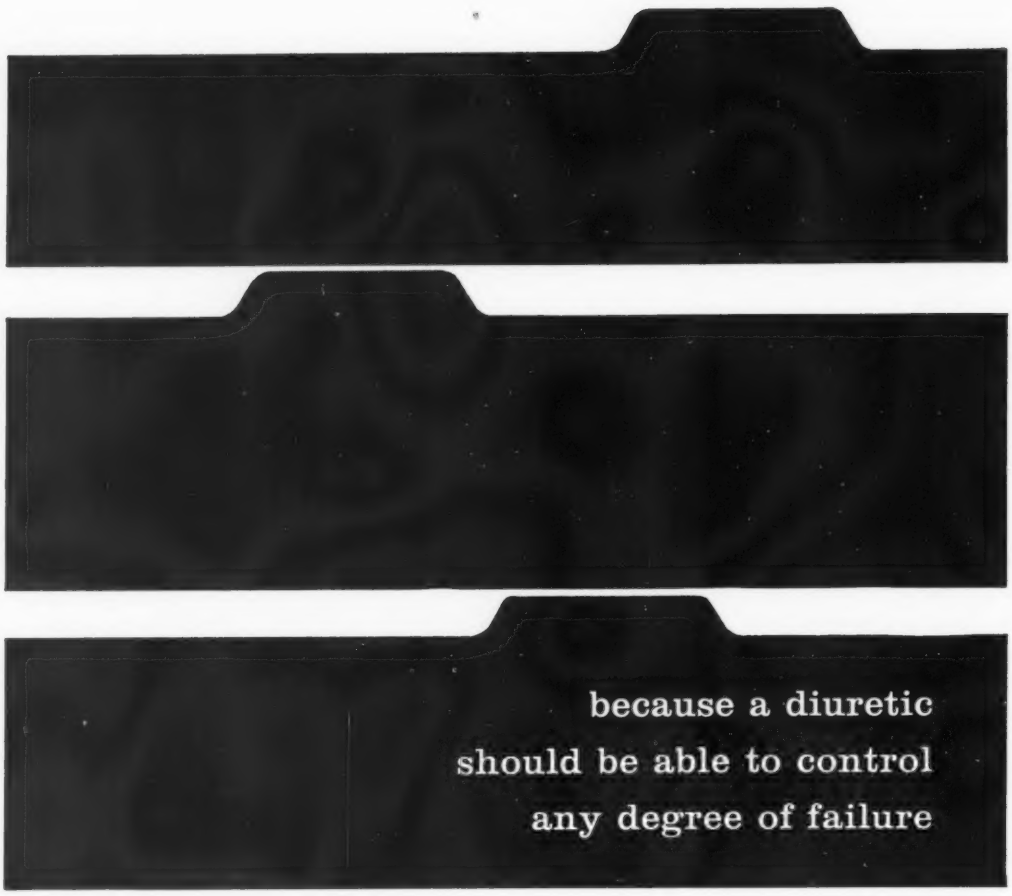

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Certain diuretics are apt to mask the gradual onset of severe failure because they are effective only in the milder ambulatory cardiacs. The recurrent accumulation of fluid permitted by intermittent or arbitrarily limited dosage must eventually progress to more severe decompensation.

Because they can control *any* grade of failure, the organomercurials improve prognosis and prolong life.

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BRAND OF CHLORMERODRIN (18.3 MG. OF 3-CHLOROMERCURI-2-METHOXY-PROPYLUREA EQUIVALENT TO 10 MG. OF NON-IONIC MERCURY IN EACH TABLET)

a standard for initial control of severe failure

MERCUHYDRIN® SODIUM

BRAND OF MERALLURIDE INJECTION

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LAKESIDE

The JOURNAL of the AMERICAN OSTEOPATHIC ASSOCIATION

Dec. 1956 Vol. 56, No. 4

The origins and manifestations of LOCAL VASOMOTOR DISTURBANCES

and their clinical significance*

HARRY M. WRIGHT, D.O.
Department of Physiology and Pharmacology
Kirksville College of Osteopathy and Surgery
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THE PHYSICIAN AND scientist eternally search for a better understanding of the origins, the nature of, and the remedies for the ills that plague mankind. From the multitude of clinical and experimental observations made in recent years, this search appears to reveal that many so-called diseases may in reality stem from factors or disturbed physiological mechanisms which are common to all of them. Possibly the most important and most common single pathogenic mechanism which appears to emerge from the observations reported in the medical literature is the alteration or local disturbance in the circulation of a tissue or organ. These reported observations cover a wide spectrum of syndromes ranging from tonsillitis to poliomyelitis and even malignancy, and all suggest that they may share in this common mechanism or origin, that is, some alteration in the local circulation of the involved organ or tissue.

In many instances the circulatory disturbance appears to be that of local ischemia with a concomitant hypoxia of the tissue. In other syndromes the predominant predisposing feature may, however, be a prolonged vasodilatation; and perhaps there may be intermittent shifts between ischemia and hyperemia.

However, before discussing in more detail the origins, characteristics, and significance of these vascular alterations, a few observations will be cited which illustrate this concept of local vascular disturbances as a common pathogenic mechanism.

I. Clinical manifestations of disturbed vasomotor activity

In extensive observations on the toxemias of pregnancy Assali[1] found that in toxemia there is a widespread arteriolar constriction involving not only the peripheral circulation but also the circulation of the kidney, brain, and pregnant uterus.

In a series of investigations on patients with Raynaud's disease, Graham[2] observed that constriction of the capillaries, venules, and arterioles of the skin could be induced by such emotional disturbances as hostility or anxiety. Conversely, states of depression were associated with constriction of the arterioles and decreased tone of the capillaries and venules; and the same person might develop different vascular changes at different times with different emotional states. In other studies Graham[3,4] also observed that dilatation of the arterioles and constriction of the minute vessels often occur in patients with eczema and psoriasis when they are subjected to stressful life situations.

Borelli and his associates[5] concluded that two thirds of a group of sixty-two patients who had neurodermatitis showed sympathetic hypertonus of the skin vessels.

A great deal of additional evidence indicates that other skin diseases, including scleroderma,[6,7] lichen planus,[6,7] urticaria,[8] lupus erythematosus[7,9,10] dermatomyositis, perniosis, poikiloderma vasculare, ichthyosis,[9] ischemic ulcers,[11] et cetera, in addition to Raynaud's disease,[12] , eczema, and psoriasis,[3,4,6,7,13,14] are associated with vascular disturbances.

Block and his colleagues[15] have shown experimentally that the production of temporary or permanent ischemia of the pancreas is an important factor in the development of necrosis of the parenchyma of the pancreas, a syndrome analogous to acute hemorrhagic pancreatitis in man. The partial or complete obstruction of the pancreatic duct or occlusion of the common bile duct was insufficient to produce necrosis of the pancreas; only when the additional factor of temporary or permanent ischemia was induced, did pancreatic necrosis develop. They not only concluded that acute pancreatitis can result from prolonged severe and extensive ischemia alone, but that the severity of the pancreatic lesion will depend on the degree of ischemia. Other observations with respect to the importance of vascular alterations in the pathogenesis of acute pancreatitis have been made by Longo and his associates.[16,17]

Vasomotor disturbances appear to have an important etiologic role in many of the so-called constitu-

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tional or chronic endogenous degenerative syndromes. Kovacs[18] observed a noticeable diminution in the volume of the peripheral circulation with a great reduction in the number of capillaries in the peripheral tissues in patients with rheumatoid arthritis. The thin, glossy, atrophic skin with cold, pale, clammy hands and feet and the cutaneous pigmentation in persons with rheumatoid arthritis result from impairment of the circulation. In contrast the blood flow to the articular tissues is increased and the affected joints may show an increase in local temperature. In a study of the vascular responses of patients with rheumatoid arthritis, Naide and his associates[19] found that the vascular tone in these patients is high. The peripheral vessels were easily constricted. Both Kovacs and Naide, on the basis of their investigations, concluded that this high vascular tone may be one of the basic factors in predisposing persons to rheumatoid arthritis and to exacerbations of the condition after emotional upsets and exposure to cold.

Appreciation for the importance of "lowered resistance" or functional impairment of a tissue resulting from an alteration in its circulation in the pathogenesis of infectious diseases is found in this statement of more than 30 years ago by Nedzel:[20]

> In the modern trend of medical bacteriology we are coming more and more to the conception that the mere presence of bacteria or their increased virulency is not always sufficient to cause an infection. Often it is necessary to have another factor, the so-called lowered resistance . . . no matter what its cause. This latter factor, first, permits the localization of bacteria, and second, favors their activities, which are then accompanied with proper pathological changes in tissues of lowered resistance.

In extensive investigations Nedzel[20] found that reflex vasomotor changes in the kidney in response to chilling of the body were accompanied by increased permeability of the capillary blood vessels enhancing the opportunity of pathogenic bacteria in the blood to invade the kidney.

And, in that same era Grant, Mudd, and Goldman[21] found that chilling of the surface of the body causes vasoconstriction and ischemia with a simultaneous proliferation of the organisms present in the mouth, thus enhancing the development of sore throats and tonsillitis.

More recently, Dubos,[22] speaking on the occasion of the 1953 Warren Triennial Prize of Massachusetts General Hospital, stated:

> This dependence of susceptibility to infection upon the physiological status of the host is of course a familiar observation. However commonplace, it focuses attention upon an aspect of the infectious disease which is much neglected. Most human beings, indeed probably all living things, carry throughout life a variety of microbial agents potentially pathogenic for them. Under most conditions, these pathogens do not manifest their presence by either symptoms or lesions; only when something happens which upsets the equilibrium between host and parasite does infection evolve into disease. In other words, infection is in many cases the normal state; it is only disease which is abnormal.

From the extensive observations of a distinguished scientist, it appears that local disturbances in the circulation may also have a primary role in the development of cancer. In a recent publication in which he reviewed all known carcinogenic agents, Otto Warburg[23] concluded that in all instances the mechanism of action is the irreversible injuring of cellular respiration. Referring to the induction of cancer by numerous known carcinogenic irritants and processes which cause chronic intermittent oxygen deficiency, he stated, "In all these cases, the intermittent irritations lead to intermittent circulatory disturbances."

I have drawn your attention to only a few of the multitude of observations made by many physicians and scientists which confirm the concept that a temporary or permanent alteration in the circulation of a viscus or tissue is an important mechanism in the pathogenesis of many acute and chronic syndromes; references to many more are appended.[24-50]

II. Origins of local vasomotor disturbances

What are the origins and mechanisms of local vasomotor disturbances, and what contribution can osteopathic theory, practice, and research make to their diagnosis and therapy?

Although localized vasomotor disturbances might conceivably originate from local areas of trauma, disuse, developmental defects, the local action of metabolites, etc., most investigators agree that in most instances localized vasomotor disturbances are manifestations of autonomic imbalance.[40,43,46-49,51-55] This imbalance often appears to be in the direction of sympathetic hyperactivity causing vasospasm or ischemia of the involved tissue. It must be remembered, however, that with the passage of time the sympathetic mechanisms, or the vascular musculature itself, may "fatigue out" and ischemia may be replaced by hyperemia, or stasis and transudation, edema or inflammation.[16] The concept of sympathicotonia is supported by a mass of clinical evidence that numerous and seemingly unrelated clinical entities are relieved or improved by the surgical interruption or pharmacologic blockade of selected regional or local sympathetic pathways.[46,48,49,56]

White, Smithwick, and Simeone[56] have made a comprehensive review of the extensive therapeutic applications of regional sympathectomy and paravertebral sympathetic block in many syndromes including hypertension, Raynaud's disease, scleroderma, causalgia, intractable visceral pain, neuralgias, thromboangiitis obliterans, erythromelalgia, arteriosclerosis, vasospastic states, cardiospasm, frostbite, pylorospasm, etc. Furthermore, such familiar blocking agents as Dibenamine, Priscoline, hexamethonium, and similar pharmacologic products are accepted parts of the modern physician's therapeutic armamentarium and are extensively used in the treatment of hypertension, vasospastic states, and peripheral vascular syndromes.

III. How may local vascular disturbances act as a pathogenic mechanism?

1. *By reduction in the functional reserve* of an organ or tissue, that is, impairment of its capacity to respond to increased physiological demands. This is dramatically illustrated in a patient with coronary heart disease. The signs and symptoms of increased functional demands on an ischemic myocardium are known only too well to both the patient and the physician to need enumeration here.

2. *By lowering resistance to infection* by bacteria or secondary invaders. Or, as Dubos[22] expressed it, ". . . only when something happens which upsets the equilibrium between host and parasite does infection evolve into disease." In this manner, local vasomotor disturbances may play an important role in the pathogenesis of acute and chronic infectious diseases.

3. *By alteration in the response of a tissue or vis-*

cus to normal nervous and hormonal influences. Such alterations in tissue response may mislead the physician because diagnostic signs and symptoms may be masked. For example, ischemia of the stomach or duodenum may so alter response to the normal parasympathetic influence on secretion and motility that the symptoms may appear to be that of parasympathetic hyperactivity. This concept has previously been discussed by Korr.[57]

In a recent publication, J. Earl Thomas[58] stated:

> It has been suggested that both gastric and duodenal ulcers are due to erosion of the mucous membrane by acid and pepsin in the gastric juice. This is probably true of the actual process of erosion but the low acidity in gastric ulcer and the fact that many patients with duodenal ulcer secrete no more acid than do normal subjects suggests that other factors are of more fundamental significance. These probably have to do with the natural defenses of the mucous membrane against acid erosion.

Commenting further on gastrointestinal erosion, he continued:

> There is abundant experimental proof that prolonged stress can cause gastrointestinal erosions in experimental animals; clinical experience indicates also that duodenal ulcer in the human is aggravated by various forms of stress. Probably not all the gastrointestinal damage associated with stress is to be attributed to excess acid secretion; indeed, the widespread and often obscure tissue changes associated with severe stress and with excess or depletion by exhaustion of the hormones involved in stressful situations provide a wide range of possibilities for changes in local tissue resistance.

4. *By local vascular disturbance in any of the endocrine glands,* which might conceivably act as a pathogenic mechanism producing widespread effects which might obscure their local origin.[57] For example, an alteration in the circulation of the thyroid gland might directly influence its activity and thereby the metabolic activity of every cell in the body. An analogous situation might be cited for any of the endocrines.

5. *By vascular disturbance in nervous tissue itself.* An altered circulation through local areas of the brain, spinal cord, or the peripheral nerves may produce many, diverse, often remote, and diffuse effects. This subject has been reviewed by my colleague, Dr. P. E. Thomas.[59]

IV. Origins of local autonomic imbalance

If, therefore, local vascular disturbances are manifestations of local autonomic imbalance, the factors which may initiate or contribute to this imbalance will undoubtedly be important factors in determining which viscus or tissue will sustain this pathogenic process in the individual. In other words, what are the factors that determine the "target" organ? What factors determine whether an individual is predisposed to coronary insufficiency, nephritis, pancreatitis, or peptic ulcer?

Obviously the answer cannot possibly be a simple one, and multiple factors and causes are probably involved. However, the evidence is rapidly accumulating that somatic stresses and myofascial mechanisms have an important role as localizing factors or determinants in creating or sustaining localized autonomic imbalance.

Extensive research on the somatic contribution to the disease process, which was originally—but is no longer—the exclusive premise of the osteopathic profession, is now going on at an accelerated pace both in our own country and abroad. In Europe, the numerous observations in this rapidly growing field have led to the publishing of completely new scientific journals such as *Acta Neurovegetativa* and *Neuralmedizin.* Other investigations on the somatic component of disease embrace the contribution of Travell, Rinzler, and others[60-66] on myofascial trigger mechanisms and somatic components of pain; Gutstein's[67,68] observations on myodysneuria; Gorrell's[69] observations on musculofascial pain; the observations of Dittrich[70-77] on referred pain from somatic structures and reflex sympathetic dystrophy, Dittmar's[78] work on cutaneovisceral reflexes and segmental therapy; the observations of Trueta[79,80] and of Bodian[81] on poliomyelitis and the physiologic mechanisms involved in the localization of paralysis; the work of Lewis[82,83] and of Kellgren[84] on somatic pain and visceromotor reflexes; the observations of Evans[85] on reflex sympathetic dystrophy; and the contributions of many other investigators.[86-97] The important contribution which the osteopathic profession makes to this field is the recognition of the somatic origins of localized autonomic imbalance from musculoskeletal stresses and myofascial mechanisms arising principally from maladaptation to the erect stance or postural stresses.[57,94,98] Clinical experiences as well as the evidence emanating from research programs both within and without the osteopathic profession strengthen the validity of this concept.

V. Evidence for the existence of localized autonomic imbalance

Two years ago at the convention of the American Osteopathic Association in Toronto, three members of the Department of Physiology engaged in research at Kirksville College of Osteopathy and Surgery presented experimental evidence for local or segmental autonomic imbalance as shown by sudomotor and vasomotor manifestations in the skin.[57] Extensive observations since that time appear to confirm the existence of *normal regional variations* or "gradients" in sympathetic tone on the trunk, as well as marked *aberrations* in tone at certain segmental levels or differences between the right and left sides at a given segmental level in many individuals.

Evidence, derived by three different methods, for the existence of normal segmental or regional gradients in sympathetic vasomotor tone on the trunk is shown in Figures 1, 2, and 3. The methods used were: (1) measurement of skin temperature, (2) photometry (absorption by the skin and its blood content of light of a specific wave length), and (3) observation of the response of the skin vessels to mechanical stimulation (the "red response").

When the skin temperature was measured with thermocouples at points equidistant to the right and left of the vertebral column at each segmental level in a number of individuals, the skin was usually found to be warmer in the upper and mid-thoracic areas and cooler in the low thoracic and lumbar regions (Fig. 1).

Although skin temperature per se cannot be directly interpreted in terms of vasomotor tone, warm skin is frequently associated with increased peripheral blood flow (low vascular tone), while cool skin may be associated with vasoconstriction (high vascular tone.)[99,100]

Photometry has recently been utilized for estimating the blood content of the skin.[101-107] The photometer which we at Kirksville College designed and have utilized in our investigations is similar to that which Adams-Ray[101,102] used for measuring the spectral reflectance of the skin in studies on the vascular tone of the subpapillary venous plexus. The principle of this method is essentially as follows: Green light with a predominant wave length of 500 mμ is strongly absorbed by both reduced and oxygenated hemoglobin. A

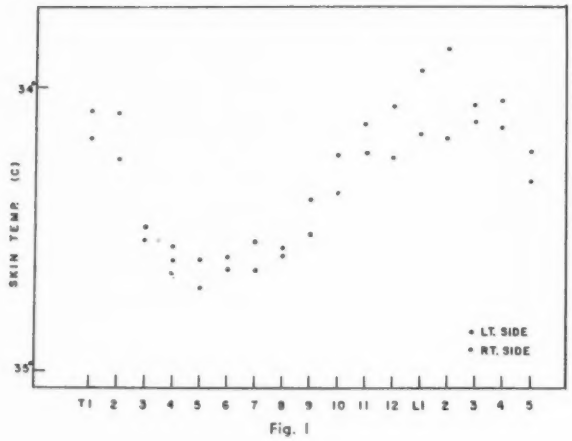

Fig. 1

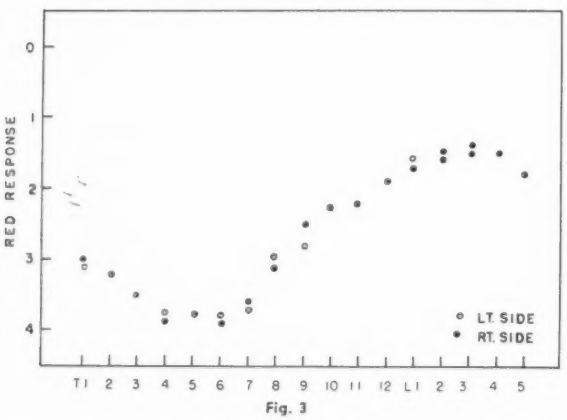

Fig. 3

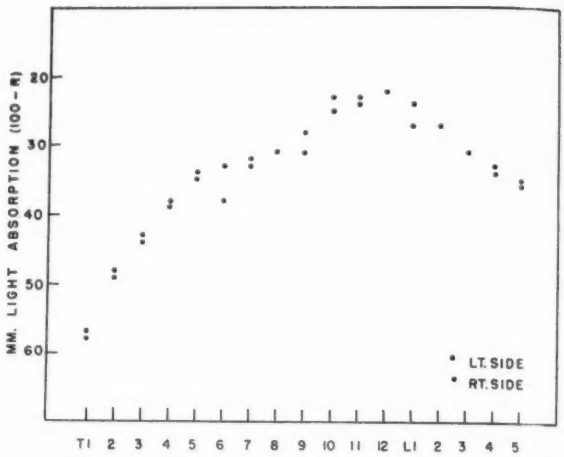

Fig. 2

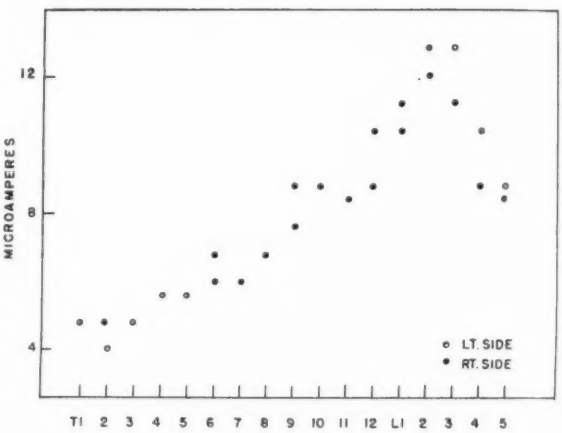

Fig. 4

Figs. 1-4. Evidence of a normal gradient in sympathetic tone. The graphs in Figures 1, 2, 3, and 4 represent average values for various vasomotor and sudomotor activities at thoracic and lumbar spinal segments as determined from observations on a large number of individuals. The ordinates in these graphs have been so oriented as to indicate the direction of progressive increment of the sympathetic tone presumed to be responsible for these manifestations; e.g., in Figure 1 the temperature scale is inverted because increasing sympathetic tone, causing vasoconstriction, would tend to reduce skin temperature. Further description of the methods and data is found in the text. Examination of these graphs collectively suggests that a gradient in sympathetic tone exists on the trunk with tone being least at upper and mid-thoracic levels and greatest at low thoracic and lumbar levels. Note the similarity of this gradient in autonomic activity to the gradient in reflex motor thresholds as shown by Denslow (Reference 115) in Figure 5.

Fig. 1. Skin temperature. This graph was derived by averaging the skin temperatures of sixteen individuals at each segmental level on the trunk. Note that the skin is warmest in the upper and mid-thoracic areas and coolest in the low thoracic and lumbar areas. Increased sympathetic tone would cause vasoconstriction and cool skin.

Fig. 2. Blood content (light absorption). This graph was derived by averaging the absorption by the skin of incident light of the wave length 550 mμ at each spinal level in ten individuals. This wave length is strongly absorbed by hemoglobin, and therefore may be used as a measure of the blood content of the skin. Increased sympathetic tone would reduce the blood content of the skin and thus reduce the light absorption.

Fig. 3. Red response (erythema). This graph was derived by averaging a large number of observations on the red response to standardized stroking of the skin in eighteen individuals. Values of the ordinates represent arbitrary units according to the persistence of the response. Grade 1 indicates that the erythema persisted for 30 seconds or less, Grade 2 for 60 seconds, Grade 3, 90 seconds, Grade 4, 2 minutes or more. Increased sympathetic tone would reduce the persistence of the response, as would be indicated by Grade 1 or 2.

Fig. 4. Electrical skin conductance. This graph was derived by averaging the electrical conductance values of the skin of twenty-five individuals at each spinal segment. Increased sympathetic tone causes increased sweat gland activity which enhances the electrical conductivity of the skin. Note the progressive increase in conductance toward the lower thoracic area which is consistent with a progressive increment in sympathetic tone.

small area of skin is exposed to light of this wave length and of a standardized intensity, and the intensity of the reflected light is photoelectrically measured. The greater the amount of blood in the skin, the larger is the portion of incident light which is absorbed and the smaller the portion reflected. The reflected light is quantitated in terms of millimeters of deflection of a galvanometer. To do this, the reflectance from the skin is compared to the reflectance from a white porcelain plate which is arbitrarily fixed at 100 mm. The quantity of light absorbed by the skin and its blood content is then found by subtracting the skin reflectance from 100 (100–R).

Figure 2 shows the average absorption of light (550 mμ) by the skin at each segmental level on the trunk, as determined by a number of observations. It was found that absorption of this light by the skin is greatest in the upper thoracic areas and least in the low thoracic and lumbar regions, which suggests that the blood content of the skin is greater in the upper thoracic region than in the low thoracic or lumbar area. This finding is consistent with the concept of greater vasomotor tone in the low thoracic and lumbar areas than in the upper and mid-thoracic region.

Another method used for studying vascular tone on the trunk is that of observing the response of the cu-

taneous vasculature to mechanical stroking. The vascular dilatation or erythema elicited by mechanically stroking the skin was first called the "red response" by the late Sir Thomas Lewis,[108] and is a part of the "triple response" described by him.

I have described observations on the red response in previous papers.[57,109] In these studies the erythema was elicited by an instrument or "skin stroker" which simultaneously applied a standardized frictional stimulus to both the right and left sides of the back at equal distances from the spinal column and extending from the first thoracic vertebra to the sacrum.

It was observed that the erythema or red response thus produced was feeble and faded quickly at some segmental levels while at other levels it was intense and persisted for several minutes. The time required for the erythema to fade appears to be related to the tone of the vessels; that is, if vascular tone is high, the vasodilatation is brief, whereas if the vessel tone is low, the vasodilatation persists for a longer period. The responses were graded from 1 to 4 at each segmental level according to the sequence of their fading. At the segmental levels where the erythema faded first (i.e., in 30 seconds or less), the response was recorded as grade 1. At the levels where the erythema persisted for the longest period (2 minutes or more), the response was recorded as grade 4. Grades 2 and 3 represented responses with intermediate fading time.

The average curve seen in Figure 3 suggests that differences in vascular tone exist at different segmental levels, because the red response usually fades first in the low thoracic and lumbar areas and persists longest in the upper and mid-thoracic areas. This suggests that vasomotor tone is lowest in the area from the third to the seventh thoracic vertebra and greatest in the area from the first to the fourth lumbar vertebra, with a progressive gradient in tone from the sixth thoracic vertebra to the thoracolumbar junction.

The correlations between the temperature, red response, and light absorption curves (Figs. 1, 2, and 3) suggest that a regional gradient in vasomotor tone exists on the trunk, and that sympathetic vasomotor tone is *normally* greater in the low thoracic and lumbar regions than in the upper and mid-thoracic areas. It therefore follows that where the vascular tone of the skin is high, the temperature of the skin is cooler, the red response less persistent, and the blood content of the skin less than where vascular tone is low.

Further confirmation of a gradient in sympathetic tone on the trunk may be seen in an analysis of sudomotor thresholds. The average electrical conductance values of the skin at each segmental level is shown in Figure 4. The electrical conductance of the skin is related to sweat gland activity which is controlled by the autonomic nervous system.[110-114] Again, there is an obvious similarity between this sudomotor threshold curve and the graphs for vasomotor manifestations shown in Figures 1, 2, and 3.

A similar gradient with respect to motor reflex thresholds was shown by Denslow[115] several years ago (Fig. 5). The essential parallelism between the red response curve (Fig. 3) and the motor reflex threshold curve is very evident, indicating a common factor and the close inter-relationship of somatic and autonomic functions.

Recognition of *normal* regional differences in sympathetic tone on the trunk provides a valuable background of information for the comparison of individuals or patients, for many individuals show marked local aberrations from these "average" or "norm"

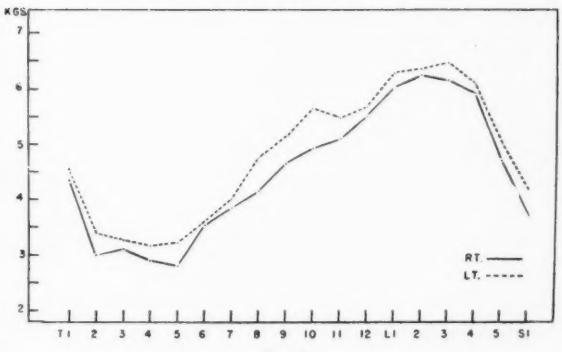

Fig. 5

Fig. 5. Motor reflex thresholds. This is a graph of segmental variations in motor reflex thresholds based on averages from thirty individuals (Redrawn from Denslow Reference 115). It shows the average kilogram of moving pressure stimulation at each spinal segment necessary to elicit reflex contraction of the paravertebral muscles as detected by electromyography. Low reflex thresholds indicate increased motoneuron excitability. The similarity between this graph and those in Figures 3 and 4 emphasizes the close relationship between somatic and autonomic functions.

curves. For example, Figure 6 shows the distinctive skin temperature graph of such an individual. The graph represents the average of 10 skin-temperature surveys made on this individual over a period of weeks. Persistent differences in temperature between the right and left sides are especially apparent in the mid- and low thoracic areas.

Similarly, the red response chart of another individual is shown in Figure 7. Marked asymmetries in response between the right and left sides may be observed, especially at the level of the fifth thoracic vertebra.

Figure 8 shows asymmetries in the cutaneous blood content (light absorption) of one subject. In this individual, marked differences in the light absorption of the skin between the right and left sides are apparent throughout most of the thoracic area.

These local aberrations in vasomotor tone, as evidenced by asymmetries in the skin temperature, light absorption, and red response patterns, appear to represent areas of local autonomic imbalance on the trunk.[57,109] We have found such local areas of autonomic imbalance in both clinical patients as well as in persons who did not manifest clinical symptoms at the time the observations were made.[57,109] It is well known, of course, that patients suffering from acute or chronic visceral disturbances may reflexly show cutaneous vasomotor alterations. Many clinicians have observed a pale, cool, sweating skin in the segmentally related dermatomes in patients with acute myocardial infarction.[116,117] Similarly, it has been shown that in patients with acute or subacute cholecystitis pallor of the skin can be demonstrated in the segmental reference zone from the seventh to ninth thoracic vertebra, characteristic of that viscus.[101] Similar observations have been reported by other clinicians with respect to other acute visceral syndromes such as appendicitis, salpingitis, etc.[88,102,119]

However, local cutaneous vasomotor disturbances as cutaneous manifestations of local autonomic imbalance have still another significance. Because of the known *parallelism* that has been repeatedly shown to exist between the visceral and cutaneous circulations,[120-126] stimuli which induce a vascular response, for example vasoconstriction in the cutaneous circula-

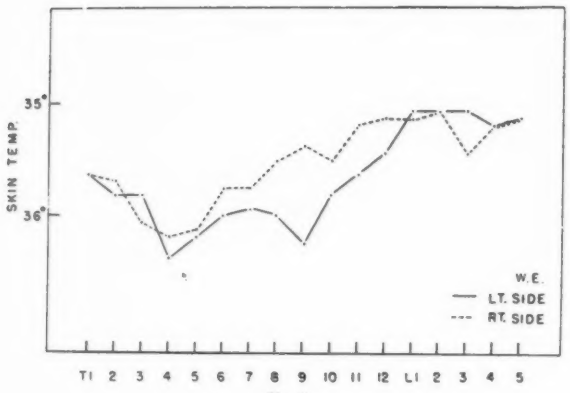

Fig. 6

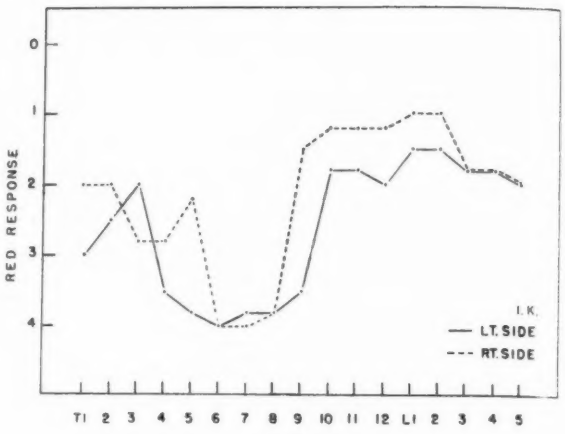

Fig. 7

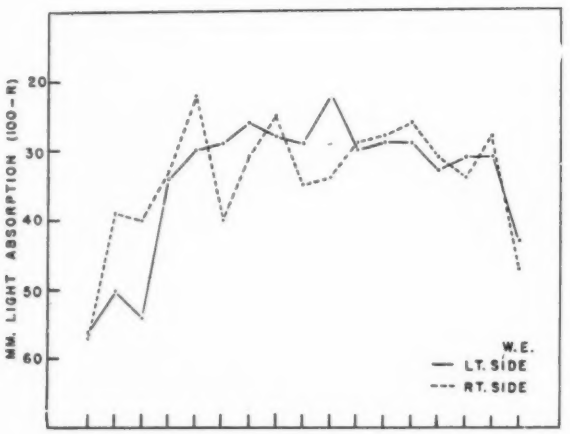

Fig. 8

Figs. 6-8. Evidence of local or segmental aberrations in sympathetic vasomotor tone. The graphs in Figures 6, 7, and 8 illustrate on two subjects asymmetries in vasomotor manifestations which have been observed on many individuals. (The ordinates are oriented in the same manner as for Figures 1-4.) These local aberrations in vasomotor tone, as manifested by asymmetries in the temperature, red response, and light absorption of the skin, appear to represent areas of local autonomic imbalance on the trunk.

Fig. 6. Skin temperature. This graph shows the average of ten skin temperature observations at each segmental level on this individual. Persistent differences in skin temperature between the right and left sides are apparent in the mid- and low thoracic areas—seventh to twelfth thoracic vertebra.

Fig. 7. Red response (erythema). This graph shows that the persistence of the erythema elicited by mechanical stroking differed markedly between the right and left sides, especially in the upper thoracic area—first to sixth thoracic vertebra, in this individual.

Fig. 8. Blood content (light absorption). Comparison of the light absorption of the skin between the right and left sides of this individual shows marked differences throughout most of the thoracic area. Differences in the light-absorbing capacity of the skin may reflect differences in blood content of the skin.

tion, may likewise reflexly induce a similar vascular change in segmentally related structures. Therefore, it appears that stimuli arising from myofascial or somatic stresses in the musculoskeletal system may induce parallel vascular responses, via viscerosomatic and somativisceral reflexes mediated over sympathetic pathways, in *visceral* as well as *somatic* tissues. Such somatic stresses are thus important, not only as etiologic factors of local autonomic imbalance, but the *location* of the stress areas in each individual becomes important in determining which organs or tissues will sustain this pathogenic mechanism of disturbed circulation. The somatic stress area may, therefore, become a significant localizing factor contributing to the origin, maintenance, or exacerbation of many and diverse acute and chronic pathologic syndromes. Thus, the somatic stress area represents a vulnerable area, not only in the musculoskeletal system, but in all other tissues reflexly related to it through the nervous system.[57,127-130]

Summary

1. A local circulatory disturbance in an organ or tissue is an important pathogenic mechanism.

2. Local vasomotor disturbances may be manifestations of local autonomic imbalance.

3. Local autonomic imbalance may be initiated or sustained by musculoskeletal stresses or myofascial mechanisms. Research observations have been presented showing local areas of disturbed vasomotion on the trunk as a manifestation of this imbalance.

4. Through the mechanism of autonomic imbalance with concomitant circulatory alterations, somatic stresses may be important localizing factors in determining what visceral syndrome the patient may develop. In this manner such somatic stress areas play important roles in the initiation, maintenance, or exacerbation of numerous acute and chronic disease entities.

5. Therapeutic attention to the musculoskeletal system, therefore, offers a specific approach to local autonomic imbalance and thereby enhances the patient's resistance to, and recovery from, many diverse disease entities. Recognition of the implications of local autonomic imbalance is the basis for a worth-while contribution to modern medical concepts of etiology, diagnosis, and rational therapeutics by the osteopathic profession.

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Use and Abuse of ANTIANEMICS and HEMATINICS*

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According to the dictionary, anemia is the loss of normal balance between the productive and the destructive blood processes and is due to diminution of the normal blood volume, as after hemorrhage, or to deficiency in the number of red cells, hemoglobin, or both. Microscopically the types of anemia are classified as normocytic, macrocytic, and microcytic, the classification being based upon the mean size of the erythrocytes. Clinically, anemia is marked by varying degrees of pallor, dyspnea, and palpitations. An antianemic is a substance which relieves anemia and is used in alleviating or curing the condition. An antianemic factor is a substance counteracting or preventing anemia, usually the specific principle in liver used in treating pernicious anemia. Hematinic means relating to hematin, or it is an agent which tends to increase the hemoglobin content of the blood.[1]

Wintrobe[2] gives a complete morphologic, etiologic, and clinical classification of anemia. Since space does not permit discussion of the treatment of all types of anemia, this paper will be limited to (1) megaloblastic (with special reference to pernicious anemia) and nonmegaloblastic macrocytic anemia, and (2) hypochromic microcytic anemia of iron deficiency.

As is the case in treating any condition, every attempt should be made to make a correct diagnosis and to find the etiologic factor or factors responsible for the anemia in a particular patient. Diagnosis of the type of anemia is extremely important since treatment of the various types differs; therefore any necessary diagnostic tests should be performed.

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Once the diagnosis of pernicious anemia has been ascertained, vitamin B_{12} appears to be the treatment of choice today.[3-5] Many routes of administration have been tried with interesting results. Besides parenteral administration, inhalation and nasal instillation of crystalline vitamin B_{12} in isotonic sodium chloride solution and lactose powder has resulted in adequate clinical and hematologic response.[6] The investigators feel that this simple form of therapy is effective, safe, and economical. The administration of vitamin B_{12} by mouth has been studied by many investigators; one group[3] feels that about 100 times more is required for adequate response with oral administration than with the parenteral route. The average hematologic effect of 3,000 micrograms of vitamin B_{12} by mouth was not significantly different from that produced by parenteral administration of 40 micrograms.[7,8]

The facilitation of absorption of vitamin B_{12} when intrinsic factor is given at the same time or within 12 hours has been noted by several investigators.[4,5,8] However, Lowther, Alexander, and Hendry[5] have pointed out that they do not suggest its use in every case of pernicious anemia, since they also recognize that the complete control of pernicious anemia afforded by repeated injections is not an advantage lightly to be abandoned. Ross and his group[7] feel that intrinsic factor plays little part in the absorption of comparatively large and unphysiologic amounts of vitamin B_{12} from the gastrointestinal tract. They gave doses of 1,000 and 3,000 micrograms of vitamin B_{12} by rectum which resulted in similar hematologic effects and changes in serum B_{12} concentrations. However, all investigators agree that patients appear to vary widely in their ability to absorb the vitamin, no matter what the route of administration.

There appears to be universal accord that the use of folic acid in the treatment of pernicious anemia is injudicious. Although folic acid and vitamin B_{12} are both involved in the maturation of megaloblasts, folic acid has no place in the treatment of pernicious anemia and, in fact, can be responsible for the progression of neurologic damage despite hematologic remission.[6,8-10] Folic acid has been shown to have a harmful effect on the nervous system in pernicious anemia, and it is possible that the hematologic response to folic acid may further deplete the already sparse body stores of vitamin B_{12} to a critically low level, at which time the severe deficiency of vitamin B_{12} results in accelerated development of combined systemic disease. The time required for this depletion may be quite variable.[10,11]

Diagnosis of the type of anemia is extremely important since treatment of the various types differs . . . any necessary diagnostic test should be performed

Treatment with polypharmaceutic preparations results in loss of response to a specific agent and, therefore, in inability to confirm the diagnosis

Lowther[12] has emphasized the difficulties that may arise when antianemic treatment is undertaken without proper investigation of a case. He reports a case of iron deficiency anemia in which the patient received "shotgun" therapy with capsules containing iron, vitamin B, extract of raw liver, and folic acid. After 38 days of taking 3 mg. of folic acid daily, the patient's appetite had returned to normal and her weight had increased, but she developed subacute combined degeneration of the cord. She subsequently improved on vitamin B_{12} therapy. Lowther's further arguments against the inclusion of folic acid in the polypharmaceutic preparations follow:

1. Folic acid temporarily improves the blood picture and restores it to normal; however, the physician then must deal with a central nervous system disease, which is likely to be misdiagnosed, since subacute combined degeneration of the cord without anemia is extremely uncommon.

2. Although relief of the general symptoms of pernicious anemia is often reassuring to the patient and to the physician, it masks deterioration of the nervous system.

3. Since folic acid deficiency occurs so infrequently, this substance is not needed in multivitamin or iron preparations.

4. Whether folic acid actually precipitates cord degeneration is still uncertain.

The role of folic acid in the treatment of megaloblastic anemia other than pernicious anemia and megaloblastic anemia of pregnancy and infancy is uncontested.[8,13] Some authorities state that in megaloblastic anemia with associated gastric achlorhydria, vitamin B_{12} is the drug of choice; when hydrochloric acid is found in the gastric juice, treatment with folic acid is indicated. In rare instances dual deficiencies may coexist.[10,12] In several cases of sprue, vitamin B_{12} was administered both orally and parenterally, but adequate response was not achieved.[14-16] However, folic acid

orally gave good response.[16] Patients with sprue as well as other nutritional disorders respond better to antianemic factors when they receive an adequate diet, rich in animal proteins and low in fats and carbohydrates. Wintrobe[11] feels that folic acid has a place in the treatment of only the very rare anemias, achrestic anemia and refractory megaloblastic anemia; in the uncommon conditions, megaloblastic anemia of infancy and pernicious anemia of pregnancy; and in some cases of sprue, idiopathic steatorrhea, and nutritional macrocytic anemia.

Sturgeon and Carpenter[14] observed that severe anemia occurs sometimes in the first few months of life either spontaneously or after some nutritional digestive disorder. Morphologically, the anemia may be hyperchromic and macrocytic, but normochromic patterns are common. White cells are not invariably abnormal, but considerable thrombocytopenia and leukopenia may occur. They found that crude liver extract and folic acid are curative, but occasionally, spontaneous improvement is seen. They also found that vitamin B_{12} is effective therapeutically in some cases of megaloblastic anemia of infancy, but they believe that its effectiveness may be enhanced by adjunctive therapy with ascorbic acid.

Iron deficiency anemia is best treated with iron replacement. An important problem is whether the storage iron can be replenished with oral iron in iron-deficient patients. Estimation from blood obtained by phlebotomy and histologic study of marrow of orally treated iron-deficient patients has shown that replacement of lost iron stores takes place very slowly. This is in sharp contrast to the almost immediate uniform appearance of stainable iron in the marrow and liver of patients receiving parenteral iron.[17] Wintrobe[11] feels that iron therapy is effective in iron deficiency anemia but is otherwise not useful except as a prophylactic measure against development of iron deficiency as in pregnancy and infancy. Only rarely is parenteral iron necessary. Because it is highly desirable to replenish storage iron, oral therapy should not be discontinued as soon as the peripheral blood has returned to normal, but rather should be carried on for a period of many months.[17]

When the physician finds that the patient cannot tolerate large doses of iron because of resulting gastritis or diarrhea, too often he does not administer any iron to the patient. Smaller doses would be well tolerated and if given over a long enough period would produce satisfactory responses.[13] Adherence to this principle in the management of iron-deficient patients may help to reduce the high relapse rate of this disease. Two investigators[18] suggest, however, that patients with chronic anemia should not be maintained on iron therapy indefinitely, once refractiveness has been demonstrated by adequate therapeutic trial. Their findings lend support to the thesis that iron therapy is needless and may even be harmful in cases of chronic anemia associated with normal or increased body iron stores.

Conclusions

Liver extract, whose effect appears to be due to its content of vitamin B_{12}, is effective only in certain types of macrocytic anemia such as pernicious anemia, and related conditions such as sprue, idiopathic steatorrhea, and disorders characterized by megaloblastic bone marrow. Folic acid is useful in rare disorders and in megaloblastic anemia of infancy and pregnancy, as well as in some cases of sprue, idiopathic steatorrhea, and nutritional macrocytic anemia. It is contraindicated in pernicious anemia.

In no other forms of anemia should liver extract, vitamin B_{12}, or folic acid be used. They are of no value in anemia associated with infection, malignant disease, renal disease, or leukemia. Unless these disorders have been complicated by loss of blood to a degree sufficient to produce iron deficiency, iron administration is of no value. Blood transfusions are useful but only as a temporary procedure. The various types of anemia are affected only by the measures which relieve the underlying disorders. Treatment with polypharmaceutic preparations results in loss of response to a specific therapeutic agent and, therefore, inability to confirm the diagnosis. In addition, the cost of treatment is increased greatly. The therapeutic goal should be to attack the cause of the anemia.

A number of recent studies offer clinical evidence to warrant further study of the value of vitamin B_{12} in the treatment of painful peripheral neuropathies of diabetic, nutritional, and other origins. The mode of action is as yet obscure, but may be related to the influence of vitamin B_{12} on ribose nucleic acid synthesis in nervous tissue.

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Cardiac ARRHYTHMIAS during surgical ANESTHESIA*

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The problem

Anesthetists have long been aware that abnormalities of the heart beat are common during surgical operations. These arrhythmias are directly related to many operating room fatalities and warrant serious consideration. Evaluation of the contributing factors, means of prevention, and treatment of cardiac irregularities during surgery and anesthesia is the purpose of this presentation.

The Scope of the Problem.—

It is generally agreed that most disorders of the heart beat occurring during surgical anesthesia are transient and relatively benign. Serious ventricular arrhythmias, however, do occur with considerable frequency and are potentially lethal. The specter of cardiac arrest haunts many hospitals. Anesthetists offer a general estimate of one such catastrophe for each 1,000 anesthesias.[1] Since this includes some poor risk emergency patients the figure may not appear alarming. Accurate statistics of cardiac arrest, however, are difficult to compile. Many such cases are undoubtedly buried under other labels. Nevertheless, it is well known that their frequency varies from hospital to hospital and in some institutions is inordinately high. Hosler[1] mentions a 190-bed hospital with well-trained anesthetists in which there were eighteen cases of cardiac arrest in a period of 17 months.

It has been shown that most cases of cardiac arrest are preceded by characteristic arrhythmias which serve as warnings of impending asystole.[2] In many cases these arrhythmias are preventable. Once having occurred, they may be diagnosed and are amenable to proper therapy. In the light of present knowledge, it is not tenable to regard these accidents as unpredictable and unpreventable.

Incidence: Investigations have amply confirmed that the majority of patients under general anesthesia will show some alteration in cardiac rhythm. Since multiple variable factors are concerned in the production of arrhythmias during anesthesia, it is not surprising that all researchers have not reported the same incidence. In 1936, Kurtz, Bennett, and Shapiro[3] studied 109 patients during 113 surgical procedures performed under a variety of general anesthetic agents and found that only 21 per cent failed to show some disorder of the heart beat. This represents a somewhat higher percentage of arrhythmias than has been found in other studies. Forty-one patients in this series received cyclopropane and two, chloroform, both of which are now known to possess a distinct propensity for the production of arrhythmias unless meticulous attention is paid to certain details of their administration. There is general agreement, however, that the incidence of cardiac arrhythmias during all kinds of surgery and with all types of general anesthetic agents is very high.[3-7] Orth's[8] estimate that two thirds of the patients undergoing surgery under general anesthesia develop disturbances in cardiac rhythm is probably a conservative approximation.

Interest: The importance of this problem has stimulated clinical investigation for many years. In 1922, Lennox, Graves, and Levine[4] recorded the electrocardiograms of fifty patients under anesthesia and observed ectopic rhythms of many types. Graphic studies of the electrical activity of the human heart during surgical anesthesia were noted even before this date.[9] With the passage of time and the development of technics and methods of investigation suited to the peculiar conditions imposed by the operating room, many variables not considered by early investigators have become accessible to analysis. In recent years valuable information has accrued relative to the etiology of arrhythmias during surgical anesthesia, bearing particularly upon many heretofore unexplainable fatalities.

Detection: It is often difficult and sometimes impossible for an experienced cardiologist at the bedside to diagnose certain types of arrhythmias without the aid of an electrocardiogram. Differentiation of supraventricular from ventricular ectopic foci is extremely important; the former are usually relatively benign while the latter may be of ominous import. Furthermore, therapy differs. During anesthesia, intravenous digitalis is the drug of choice for supraventricular tachycardias[10] (atrial tachycardia, atrial flutter, and atrial fibrillation), but if given in the presence of ventricular tachycardia it will very likely prove fatal. An anesthetist with the aid of only the palpable pulse and blood pressure cannot exercise the fine discrimination upon which life or death may sometimes be contingent.

Of the large number of patients who manifest cardiac arrhythmias during surgery, in only 6.5 per cent are these detected clinically.[2] In many cases serious consequences may result if these arrhythmias are not differentiated and controlled. In view of these facts it seems reasonable to conclude that the electrocardiograph is a valuable adjunct to anesthetic equipment. Likewise, the anesthesiologist should become proficient in the electrocardiographic diagnosis of the arrhythmias.

The cathode ray electrocardiograph (continuously recording cardioscope) has been adapted to operating room use as a compact, explosion-proof instrument, more convenient and safe for this purpose than the ordinary direct writing machine. Such an instrument provides continuous information on the cardiac mechanism and is invaluable for the detection and differential diagnosis of arrhythmias during surgical anesthesia. It is well to bear in mind that electrocardiographic abnormalities frequently appear several minutes before the ectopic rhythm actually develops,[10] so that the anesthetist can be forewarned of an impending disturb-

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ance of the heart beat. In addition, the continuously recording cardioscope provides a therapeutic safeguard, enabling the anesthetist to avoid overdosage with the powerfully depressant antifibrillatory drugs.

Contributing factors

Multiple factors may be operative in the production of cardiac irregularities during general anesthesia. Hypoxia, hypercapnia, and acidosis; the direct effect of anesthetic agents, drugs, and operative manipulations; individual predisposition and susceptibility (presence of heart disease, metabolic or endocrine disturbances, electrolyte and fluid imbalance, severe anemia, et cetera); and the intangible but very important elements of skill and experience on the part of the anesthetist and surgeon may all intervene.

Hypoxia, Hypercapnia, and Acidosis.—

A number of leading authorities[1,8,11,12] affix ultimate responsibility for the precipitation of serious cardiac arrhythmias and cardiac arrest during anesthesia upon hypoxia, carbon dioxide retention, or a combination of these. This is a euphemistic way of stating that many patients are asphyxiated under the guise of anesthesia. Respiratory acidosis results from primary excess of carbon dioxide and is the metabolic consequence of hypercapnia.

Hypoxia: It is well known that severe hypoxia is associated with marked cardiac abnormalities. When the free exchange of oxygen is obstructed in an experimental animal, the production of cardiac irregularities is easily demonstrated.[13] This is also true of human beings.[14] Sloan[14] demonstrated tachycardia, followed by increasing bradycardia and hypotension, in anesthetized dogs subjected to progressive hypoxia or asphyxia. During severe hypoxia or asphyxia, faradic stimulation of the intact vagus nerve at the hilus of the lung frequently caused temporary cardiac arrest. There was no cessation of the heart beat, however, when the vagus was stimulated in the presence of adequate oxygenation.

Hypercapnia:

Within recent years, the role of carbon dioxide retention has excited considerable interest. The insidious ease with which this waste gas accumulates during closed system anesthesia has been well demonstrated by many investigators.[15-18]

The problem is of particular importance in thoracic surgery,[15] but marked carbon dioxide accumulation occurs in many patients under general anesthesia regardless of the type of surgery.[16-18] Miller and others[18] demonstrated on a surgical service that in 35 per cent of major cases in which general anesthesia was utilized, alveolar carbon dioxide concentration of at least twice normal was experienced during some 15-minute period of the operation.

Beecher and Murphy[15] pointed out that technics which provided adequate oxygen to the patient were not sufficient for removal of carbon dioxide. They suggested that the lateral position of the patient during thoracic surgery might be primarily responsible for the accumulation of this gas. Taylor and Roos[16] were unable to substantiate this premise and attributed progressive hypercapnia in all types of surgery to a vicious cycle initiated by carbon dioxide depression of a respiratory center already narcotized from the effects of the anesthetic. They recommended continuous assisted respiration as a preventive measure.

It has been shown that dogs exposed to an atmosphere high in carbon dioxide tension consistently display marked bradycardia, and that cardiac inhibition induced by stimulation of the vagus nerve under these conditions is greatly potentiated.[18,19] It is possible that hypercapnia and not hypoxia (as indicated by Sloan[14]) plays the dominant role in the potentiation of cardiac vagal reflexes.[19]

Acidosis:

Campbell[19] very brilliantly demonstrated that the toxicity of high alveolar carbon dioxide concentration was a result of its acidotic qualities. He showed that under conditions of acidosis from any cause—respiratory, metabolic, or a combination thereof—the response of the heart to sympathetic stimulation was depressed and its response to vagal stimulation enhanced.

A consideration of the Henderson-Hasselbalch equation

$$pH = p\kappa' + \log \frac{BHCO_3}{H_2CO_3}$$

clearly illustrates how carbon dioxide accumulation during anesthesia results in acidosis. It is apparent that the increased concentration of carbonic acid associated with arterial carbon dioxide retention tends to lower the pH and increase the acidity of the body fluids. The homeostatic mechanism for maintenance of normal pH in this case consists essentially of renal retention of $Na+$ and HCO_3-. This is a relatively slow defensive process, unable to keep pace with a rapid rate of alveolar carbon dioxide accumulation. As a result, the normal ratio of 20:1 for $BHCO_3:H_2CO_3$ decreases, the pH declines, and a dangerous uncompensated acidosis develops.

Maier, Rich, and Eichen[17] studied ninety patients during a variety of surgical procedures and found that respiratory acidosis was sometimes present within 10 or 15 minutes after the start of inhalation anesthesia. In a few instances, marked acidosis was present within 20 minutes. Patients with pulmonary emphysema were particularly susceptible. Maier and his coworkers, unfortunately, utilized the electrocardiograph in only a small number of cases, but in almost every instance wherein cardiac irregularities were clinically obvious, there was considerable acidosis present at the time of the disturbance in rhythm.

The Posthypercapnic Phenomenon:

A vitally important observation described by Miller and his associates[18] in 1952 concerns the precipitation of ventricular fibrillation, hypotension, and cardiac arrest in dogs when a high alveolar concentration of carbon dioxide is rapidly converted to normal. This conversion, of course, is accompanied by an equally rapid shift in hydrogen ion concentration toward the alkaline side.

Many surgeons and anesthetists may recall with poignant clarity cases of unexplained cardiac arrest in which disaster struck soon after surgery was completed—perhaps even as the last stitch was being taken to close the skin. In retrospect, they may remember that just before the fatal accident the patient had been hyperventilated or "flushed with oxygen." Referring again to the Henderson-Hasselbalch equation, it is readily seen that in the presence of hypercapnic acidosis (probably with some slight compensatory increase in $BHCO_3$), any sudden "blowing off" of carbon dioxide will result in rapid reduction of the concentration of carbonic acid and a quick shift of hydrogen ion concentration from acid toward alkaline. The body apparently does not tolerate well abrupt changes in physiologic equilibrium.

Mechanisms:

In the adequately ventilated anesthetized dog, strong faradic stimulation of the intact vagus nerve (reflex arc) causes bradycardia and hypotension but not cardiac arrest. Progressive hypoxia or asphyxia results in increasing bradycardia and hypotension, and under these conditions, electrical stimulation of the intact vagus can result in temporary cardiac arrest.[14] This is followed by ventricular escape with the establishment of an ectopic pacemaker that takes over the beat of the heart.[10,14] Apparently, at least in the experimental animal, permanent cardiac arrest (preceding respiratory failure) cannot be explained only on the basis of hypoxia, asphyxia, vagal reflexes, or a combination of these. Important as these elements are, other deleterious factors probably play a part.

Cardiac tissue is very sensitive to oxygen lack and is unable to incur any considerable oxygen debt.[20] The exact mechanism, however, by which hypoxia augments cardiac inhibition and produces irregularities of rhythm is unknown.[10]

Development of irregular rhythms occurs from continuous exposure of the heart to a high carbon dioxide tension.[20] It has been demonstrated[19] that depression of atrioventricular conduction can be correlated with decline in blood pH and that under conditions of metabolic, as well as hypercapnic, acidosis the response of the heart to vagal stimulation is enhanced. Campbell[19] attributes this augmentation of cardiac inhibition to progressive depression of pH below the level of optimum cholinesterase activity (pH 7.5 to 8.5), with consequent decreased hydrolysis of acetylcholine. This seems a plausible explanation.

Causes:

Factors operative in the production of hypoxia and hypercapnia during anesthesia are manifold; the following tabulation lists some of those which are most important:

A. Interference with respiratory gas exchange.

1. Trendelenburg, lateral flexion, and other awkward positions which restrict respiratory movements
2. Restriction of diaphragmatic excursions by retractors, abdominal packs, or gastrectasia.
3. Open thorax operations.
4. Paralysis of respiratory muscles by high spinal anesthesia, central nervous system disease, or curare-like drugs.
5. Respiratory center depression caused by overdosage with preanesthetic drugs and anesthetic agents.
6. Pulmonary disease including pulmonary edema, fibrosis, or emphysema.
7. An inadequate airway or obstruction of the airway by tracheobronchial secretions, edema, laryngospasm, or foreign bodies.
8. Tired surgical assistants leaning on the patient's abdomen or chest.

B. Deficient oxygen concentration in the anesthetic mixture.

C. Defective carbon dioxide absorption in closed system anesthetic technics.

D. Inadequate assisted respiration.

E. Circulatory insufficiency.

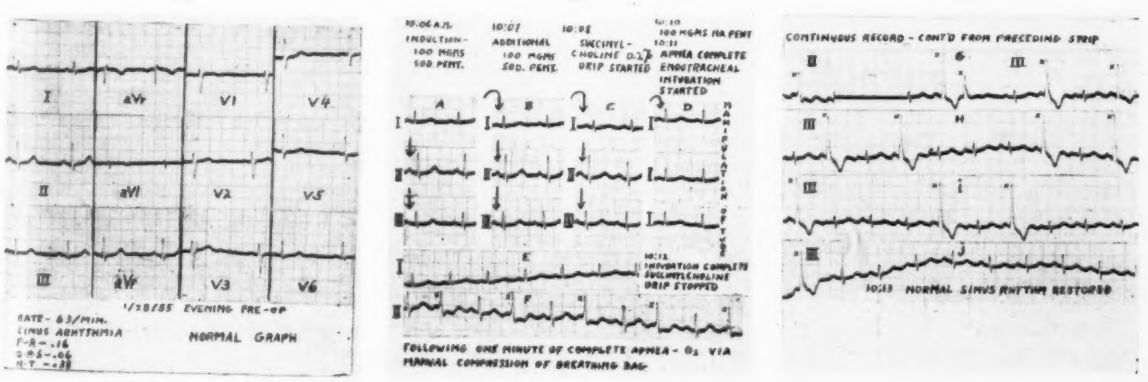
1. Arterial hypotension or shock.
2. Congestive heart failure.
3. Severe anemia.

As a general statement, oxygen lack and carbon dioxide retention may be said to result from obstruction or depression of either the respiratory or circulatory transport system from any cause. An inadequate airway is one of the chief offenders. Cullen[21] offers an estimate that 90 per cent of deaths under anesthesia are due to improper management of the airway. It is no secret that many operating room deaths have occurred during intubation. Figure 1 illustrates the sinister ventricular arrhythmias that developed in a patient following only 1 minute of apnea during intubation.

Shock is associated with cellular hypoxia and carbon dioxide retention because of deficiency of the circulatory transport system. During anesthesia, the commonest cause of shock is surgical trauma and/or blood loss.[22] This type of shock is accompanied by metabolic acidosis.[23] Quite possibly the acidosis of shock results from cellular disorganization induced by hypoxia. Serious cardiac arrhythmias themselves, such as ventricular tachycardia, may result in a marked fall in blood pressure and a shocklike state.[10] When one considers also that hypoxia is a potent factor in both the initiation and perpetuation of shock,[21] the vicious cycle is apparent. Figure 2 is a schema integrating the synergistic relationship of hypoxia, hypercapnia, acidosis, and shock in the production of cardiac irregularities.

It is easily appreciated that hypoxia and hypercap-

Fig. 1. Multiple ventricular premature beats following 1 minute of anoxia. Electrocardiograms of a 34-year-old female, no signs or symptoms of cardiovascular disease. Operative procedure: ovarian resection, appendectomy, uterine suspension, and colporrhaphy. (A) Normal preoperative electrocardiogram; (B) and (C) serial sections from continuous recording. (B) Induction with Pentothal followed by intravenous drip of succinylcholine to produce apnea and facilitate endotracheal intubation. During actual intubation (strip D) there were no graphic changes. The procedure consumed 1 minute. All this time the patient remained apneic and received no oxygen. Immediately following intubation, multiple ventricular premature systoles (X) appeared. Strip F shows ventricular bigeminus with interpolated ventricular premature complexes. (C) Multifocal and multiple ventricular premature beats are apparent in strip G. Normal rhythm was restored 1 minute following reinstitution of oxygen supply. (Multiple and multifocal ventricular premature contractions can be precursors of ventricular fibrillation.)



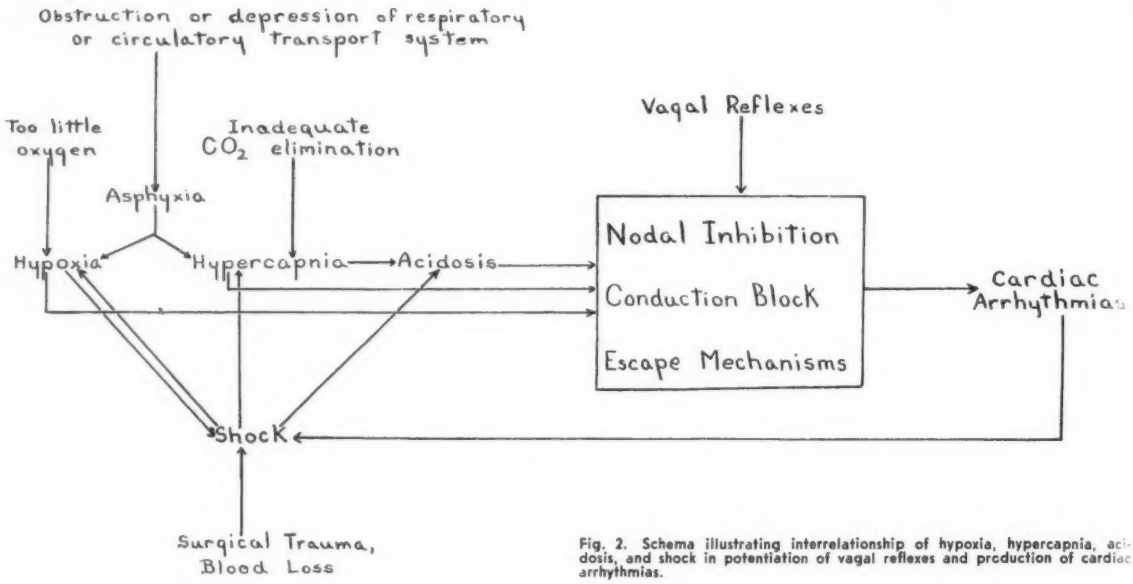


Fig. 2. Schema illustrating interrelationship of hypoxia, hypercapnia, acidosis, and shock in potentiation of vagal reflexes and production of cardiac arrhythmias.

nia occur together as features of asphyxia, but it may not be generally realized that these states can occur independently. When oxygen is supplied in adequate concentration, with inefficient elimination of carbon dioxide, hypercapnia may be present without hypoxia. Such a situation has been shown to occur quite often clinically with modern closed system anesthetic technics.[15-17] It appears, as Beecher and Murphy[15] pointed out, that more diligent assisted respiration is required to eliminate carbon dioxide than that which has been found adequate to provide sufficient oxygen. Defective or depleted carbon dioxide absorbents are undoubtedly also sometimes responsible. Conversely, when carbon dioxide is being effectively removed by the absorbent, but insufficient oxygen is supplied to the patient, hypoxia may act alone.

Detection:

Unfortunately, the clinical signs of hypoxia and hypercapnia are unreliable for early detection during general anesthesia. An absolute value of 5 grams of reduced hemoglobin per 100 cc. of capillary blood must be present before cyanosis can be detected.[20] Since normal human blood contains about 15 grams of hemoglobin per 100 cc., this value represents one third of the available hemoglobin and permits only a possible two-thirds oxygen saturation of the circulating blood, a dangerously low concentration. In the presence of even a moderate anemia, 5 grams per 100 cc. of blood represents more than one third of the available hemoglobin, and the appearance of cyanosis is associated with an even lower blood oxygen concentration. Such an individual, if allowed to become cyanotic, totters on the brink of disaster.

All anesthetic agents and narcotics depress the respiratory center.[20] Whereas a relatively slight rise in carbon dioxide tension of the blood normally evokes hyperventilation, this response is suppressed in the anesthetized patient.[17] Thus, a patient who has exhibited quiet respirations throughout surgery and shown no obvious signs of distress may still have a high degree of carbon dioxide retention. This fact has been amply verified clinically.[16] Elevation of arterial blood pressure, considered by some anesthetists to be an indication of hypercapnia, has been shown to be an unreliable sign.[17,24]

The paucity of good clinical signs of early hypoxia and carbon dioxide retention points to a need for adjunctive diagnostic aids. In this connection, the ear oximeter is a valuable instrument which facilitates early detection of hypoxia. Its routine use in the operating room should be encouraged. Some simple method of continuously sampling the patient's expired gases and recording carbon dioxide tensions would be highly advantageous. The repeated collection of blood samples is, of course, not a practical routine operating room procedure. A continuously recording, portable mass spectrometer for use in the operating room as a rapid gas analyzer has been developed at the University of Minnesota.[24] If perfected, this machine should be invaluable to the anesthetist.

Prevention:

In the absence of special devices for early detection of hypoxia and carbon dioxide accumulation, the only real insurance against their development would appear to be competent, diligent, and sustained assisted respiration throughout the period of anesthesia. This may be accomplished by manual kneading of the anesthesia bag, or perhaps by some mechanical device which satisfactorily performs the same service.[16] Keown[12] suggests, also, provision for the escape of all inspired gases during the expiratory phase of respiration.

Discontinuance of the practice of rapidly hyperventilating a patient with pure oxygen at the conclusion of an anesthetic procedure may be lifesaving. The posthypercapnic phenomenon can be avoided by "weaning" the patient to an atmosphere low in carbon dioxide tension. A gradual reduction in the concentration of inspired carbon dioxide over a period of about 15 minutes has been suggested.[18]

Adequate hemostasis, avoidance of undue tissue trauma, and prevention of excessive drops in blood pressure serve to avoid depression of the circulatory transport system.

The Anesthetic Agent.—

All general anesthetics are potentially lethal since they all possess the capacity to depress the vital centers. Their latent destructive power is held in abeyance by skillful management of anesthesia. Several anesthetic agents have been directly incriminated in the produc-

tion of serious cardiac arrhythmias. Even some of these, however, may be used safely and with advantage to the patient if administered with skill and good judgment. With this in mind, the properties of certain anesthetics will be considered relative to their tendency to precipitate abnormalities of the heart beat.

Chloroform:

There is general recognition that chloroform anesthesia is accompanied by highly undesirable effects upon the cardiovascular system.[10,21,25] Chloroform depresses the vasomotor centers, the smooth muscle of blood vessels, and has a direct depressant effect upon the myocardium. Blood pressure falls because of vasodilatation and reduction in cardiac output. The heart is further injured by anoxia resulting from respiratory depression and hypotension There is a predisposition to serious ventricular arrhythmias. Sudden death during the induction phase of anesthesia is the most common type of cardiac accident with chloroform. This may be due to ventricular fibrillation[25] or to frank cardiac arrest induced by too rapid initial concentration of the agent.[8]

Recent studies have indicated that many of the deleterious effects of chloroform may be due to unnecessarily high concentrations of the agent plus hypoventilation, with resultant hypoxia and carbon dioxide retention,[8] and that these effects can be avoided by meticulous attention to details of administration. The point is again made that even some of the most toxic anesthetics can be administered safely by an expert who observes the proper precautions. Nevertheless, the margin of safety with chloroform is narrow. Though it may be desirable that all anesthetists be sufficiently skilled to maintain a patient within this margin, one might similarly demand that all clinicians be Oslers. It therefore seems best to avoid the use of chloroform, except perhaps in rare instances when a noninflammable anesthetic agent is required and no other is available or suitable.

Trichloroethylene (Trilene):

The halogenated hydrocarbon anesthetics, which include chloroform, trichloroethylene, and ethyl chloride, have high central nervous system depressant power but increased toxicity for the heart as well as other organs.[25] All the disadvantages of chloroform apply also to trichloroethylene. The incidence of ventricular arrhythmias with this agent is even higher than with chloroform.[8] All types of ominous cardiac irregularities, including multiple and multifocal ventricular premature systoles and ventricular tachycardia, are prone to occur.

Trichloroethylene appears to have no advantages over chloroform, and the dangers incident to its use preclude its acceptance as a satisfactory general anesthetic. It has been found valuable as an analgesic for minor surgical, dental, and obstetric procedures, and with low analgesic concentrations of the agent the incidence of cardiac irregularities is reduced. Nevertheless, it should not be used without competent medical supervision to continually assess the cardiac rhythm. Commercially advocated self-administration methods are mentioned only to be condemned.

Cyclopropane:

Most authorities agree that an inordinate tendency exists for serious arrhythmias to occur under cyclopropane anesthesia.[7,8,21,26] Eisaman and his coworkers[26] reported 114 arrhythmias encountered in 113 surgical operations in which cyclopropane was used. Multiple and multifocal ventricular premature contractions were the most frequent arrhythmias. These are considered among the most serious types since ventricular fibrillation may develop from this stage as well as from ventricular tachycardia. Jaruszewski, Hellerstein, and Feil,[7] in a study of 100 cardiac surgery patients operated on by Beck, observed that most of the serious complications, such as cardiac arrest, occurred under cyclopropane anesthesia.

The exact mechanism of production of cardiac irregularities under cyclopropane anesthesia has not been entirely clarified. Cyclopropane has never been shown to cause intrinsic damage to the heart or to any other organ system.[8] Vagal inhibition of normal pacemakers probably plays a part. This is demonstrated by the abolition and prevention of arrhythmias by large doses of atropine.[7] Other possible factors that have been considered include stimulation of a center in the midbrain, bombardment of the heart by sympathetic reflexes originating in the mesentery, and sensitization of the myocardium to the action of endogenous epinephrine. It is well known that epinephrine induces serious arrhythmias in patients anesthetized with cyclopropane. Deaths due to ventricular fibrillation have occurred following its injection during cyclopropane anesthesia.[25]

Ether and Dibenamine have both been shown to reduce the incidence and severity of arrhythmias with cyclopropane.[10,25,26] It has also been proved that carbon dioxide accumulation is a precipitating factor and that its efficient elimination by manually assisted respiration prevents and abolishes the arrhythmias.[8,25] Anoxia also acts synergistically with cyclopropane to produce ectopic cardiac rhythms.[8,25] Arrhythmias with cyclopropane are more likely to occur with increasing depth of anesthesia. The use of curariform agents for muscular relaxation may enable the anesthetist to reduce the concentration of the gas to the range where serious arrhythmias are avoided.

Despite its tendency to cause cardiac arrhythmias, cyclopropane has some excellent anesthetic qualities. Many anesthetists consider this agent safe, if properly administered, even in the presence of cardiac disease. Proper administration includes continuous vigilance against development of serious arrhythmias, avoidance of anoxia and carbon dioxide retention, and reduction in concentration of cyclopropane, or substitution of a different anesthetic agent, should dangerous cardiac irregularities appear.

Ether (Diethyl Ether):

As with all general anesthetic agents, cardiac arrhythmias are common under ether anesthesia. These irregularities, however, are generally of the innocuous supraventricular variety. Serious ventricular arrhythmias are seldom encountered.[8,25] Kurtz, Bennett, and Shapiro[3] found that premature contractions occurred in only 20 per cent of patients under ether anesthesia. These arose in all cases from the atria and atrioventricular node and not in a single instance from the ventricles.

Ether has high potency and a wide margin of safety. Surgical anesthesia can be obtained with sufficient oxygen (over 90 per cent, if necessary) to prevent dangerous anoxemia. When properly administered, it is one of the safest general anesthetic agents available.

Nitrous Oxide:

Nitrous oxide is believed to be relatively innocuous to the cardiovascular system so long as it is used with an adequate concentration of oxygen. Its principal disadvantage, however, is its lack of potency. When oxygen concentration sufficient to prevent anoxia is employed, the muscular relaxation required for major

surgical procedures is usually impossible to obtain. For this reason, nitrous oxide is rarely used alone except for induction, and in operations requiring little or no muscular relaxation. Even under these conditions, the patient must be heavily premedicated to achieve induction without the necessity of using hypoxic concentrations of the gas.

Some leading authorities believe the hazards of anoxia to be so grave that nitrous oxide should never be used with less than 20 per cent oxygen at any time.[25] It is common anesthetic practice to administer 95 to 100 per cent nitrous oxide during the induction phase, until loss of consciousness has been produced, then to add 15 or 20 per cent oxygen to the anesthetic mixture. Bonica[2] feels that this practice should be condemned, particularly in patients with cardiac disease, who may not tolerate even minimal degrees of hypoxia.

The danger in the use of nitrous oxide is from hypoxia and not from the agent itself. The gas can be used to good advantage, in analgesic concentrations, for minor surgical and obstetric procedures and for supplementation of other anesthetics during major surgery. With the use of curare derivatives, nitrous oxide may be administered in safe concentrations for operations requiring muscular relaxation. Adequate oxygenation can be provided under these conditions.

Ethylene:

Ethylene, though slightly more potent than nitrous oxide, is still not a complete anesthetic agent. As with nitrous oxide, if anesthesia is to be induced with a safe concentration of oxygen (at least 20 per cent), the patient must be well premedicated. For surgical procedures in which muscular relaxation is not necessary, ethylene is ideal. Cardiac irregularities appear less often than with any other general anesthetic,[25] and these are of the benign supraventricular variety, sinus arrhythmia being the type most frequently observed.[2] Should hypoxic concentrations be employed, however, deleterious effects will naturally ensue.

Even with adequate preliminary medication, the upper second plane of anesthesia is all that can be attained safely with ethylene.[8,25] Like nitrous oxide, it must be supplemented by other anesthetic agents or curariform drugs for operations requiring very good muscular relaxation. Its explosive properties, in addition, are a distinct hazard.

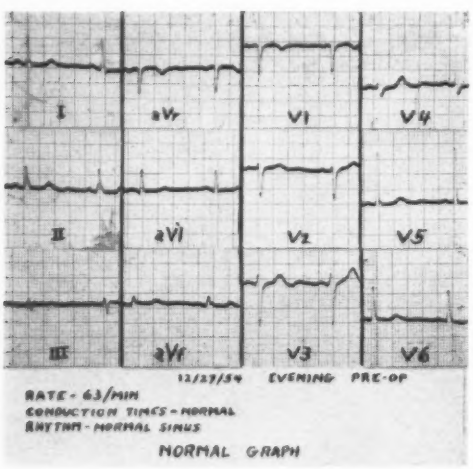
Ethyl Chloride. The pharmacologic properties of ethyl chloride are similar to those of chloroform. Its margin of safety for general anesthesia is narrow. Increased myocardial irritability occurs with its use and gives rise to many malignant arrhythmias.[2,23] Divinyl ether, a much safer agent, has largely supplanted ethyl chloride as an anesthetic agent for rapid induction.

Intravenous Barbiturates:

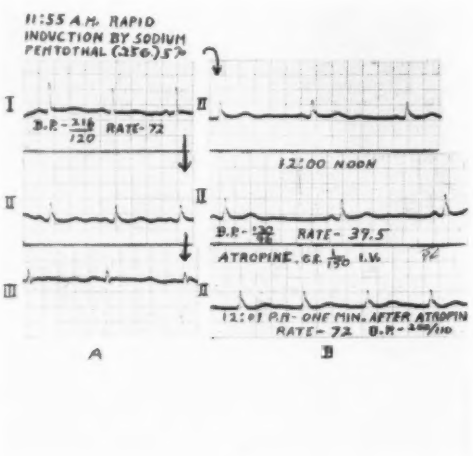
These agents, exemplified by thiopental sodium (Pentothal), are potent hypnotics but poor analgesics and muscle relaxants. When used alone, the amount of barbiturate required to effect relaxation for intra-abdominal surgery too closely approaches the lethal dose.[21] Thiopental is occasionally used for minor surgical procedures and is an excellent complementary agent to other anesthetics when skillfully administered. Because of its vagotonic action, however, it is not without danger. Laryngospasm is very likely to occur and constitutes one of the chief hazards.[21,25,27] Atropine, in adequate dosage, must be given preanesthetically, or the administration of thiopental sodium may be accompanied by stridor and laryngospasm which interfere greatly with maintenance of an airway. Severe degrees of hypoxia and carbon dioxide retention can then occur. For the same reason, endotracheal intubation under thiopental anesthesia is very dangerous unless topical anesthesia is employed prior to its administration or relaxation is provided by the use of a curariform drug.[22]

In addition to its tendency to obstruct the airway by laryngospasm, thiopental, like all intravenous barbiturates, is a potent respiratory depressant.[25,27] Constant vigilance is therefore necessary to guard against hypoxia and carbon dioxide retention. An adequate airway and oxygen supply to the patient must be assured at all times.

With proper dosage and avoidance of hypoxia and hypercapnia, serious cardiac irregularities are apparently uncommon during thiopental anesthesia.[21,25,28] It



A



A B

Fig 3. Vagotonic and hypotensive effect of a high blood concentration of thiopental sodium (Pentothal). Electrocardiograms of a 51-year-old white female. History of a cerebral vascular accident 2 years previously. Admission blood pressure 216/120. Operative procedures: dilatation and curettage followed by intrauterine application of radium. Anesthesia: induction by Pentothal; remainder of procedure under nitrous oxide and oxygen. (A) Normal preoperative electrocardiogram. (B) Serial sections from a continuous tracing following rapid intravenous injection of 0.25 gram of a 5 per cent solution of Pentothal. Blood pressure declined steadily from 216/120 to 130/96 and heart rate from 72 per minute to less than 40 per minute. One minute following intravenous administration of atropine sulfate, 1/150 grain, cardiac rate returned to 72 per minute, and blood pressure rose to 200/110. Atrioventricular nodal rhythm is present in the last section of strip B. This is sometimes observed during the initial stage of atropine effect. (The occurrence of severe bradycardia during anesthesia is a sign of impending cardiac arrest.)

is easy, however, to administer too much, and it must be borne in mind that at least 20 seconds are required for this drug to reach its peak of action after intravenous injection.[28] Thiopental should be given slowly so that an overdose will not be injected before the effect of the drug is noted. Overdosage of thiopental is followed by pronounced respiratory, vasomotor, and myocardial depression with all their serious consequences.[2] Figure 3 illustrates the effect on cardiac rate and blood pressure following too rapid injection of Pentothal in a hypertensive patient.

(To be concluded in the January JOURNAL*)*

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FUNCTIONAL

technic in

OSTEOPATHIC

manipulative treatment

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FUNCTIONAL TECHNIC is a method of applying osteopathic manipulative treatment. As is true of other technics, it is designed to improve the health of the patient. It changes function primarily and structure secondarily, and therefore is not to be considered a modification of the classic osteopathic structural technics now in general use. Reversing the usual static approach to treatment, it represents a dynamic and altogether different process. Coordinating knowledge developed from osteopathic teachings with that developed in the basic sciences, it uses the dynamic expressions of life in the patient, that is, his functions, as a basis for diagnosis and treatment. It requires, just as basic science in recent years requires, a broadened thinking and a more versatile language with which to understand and express functional as well as structural relationships.

Functional technic is one answer to the often expressed need for a more accurate way to diagnose and treat aberrations in the action of the musculoskeletal system. It is tuned to current discoveries in the basic sciences as well as to osteopathic principles and is simple to learn, although as complex as any art to apply fully. It emphasizes the osteopathic principle which gives consideration to the patient as a whole by including his musculoskeletal system and by diagnosis and treatment through the medium of that system.

The first part of this paper is an attempt to make plain, in the difficult medium of words, the application to the patient of the functional concept. The second part presents a method successfully used in teaching the technic on a touch-perception level, at the same time clarifying the words used in the first part. The third part offers suggestions for use of the technic in practice, and the fourth explains the need for the development of this dynamic technic.

The physician who would understand, use, and reap the benefits of functional technic must be willing to study its application diligently, proceeding with concentration and care in order that the accurate process may accomplish its specific purpose.

Part I: Explanation

As stated above, the purpose of functional technic is to improve the health of the patient. This end is accomplished by changing the functioning of the musculoskeletal system, and thereby altering the reaction

of the whole person. If a part of the musculoskeletal system is discovered to be functioning abnormally or unusually, it can be assumed either that it tends to produce an abnormal or unusual functioning of the whole organism or that the abnormal function of the part is the result of disturbances from the whole. In either case a vicious cycle is present, an entity of dysfunction which may be changed by treatment directed to the abnormally acting musculoskeletal system. This may be done with scientific accuracy[1] and clinical efficiency.

In the functional approach there are two main criteria: first, change in mobility and, second, change in the quality of tissue, each easily susceptible to sensory detection and evaluation. These changes give the examiner facts, the interpretation of which becomes a part of diagnosis and forms a basis for functional manipulative treatment.

It can be said that if movement in an area of the musculoskeletal system is normal; that is, adequate and free, but not excessive, in all physiologic directions and in no other, then all functions related to that area are also normal and the area can participate physiologically in any normal function required. On the one hand, the presence of normal physiologic motion indicates that normal stimuli are being sent to related parts and, on the other hand, that function of the organ is not being impaired by noxious stimuli from other parts. Also, it is assumed that if the part is found to move excessively or in abnormal direction or if it does not move adequately and freely in all normal directions, it is interfering with other functions of the part itself, with those related to viscera, and with the functioning and health of the entire individual. Motion of a part, therefore, becomes one of the most important manifestations sought. Its direction, quality, and quantity assume diagnostic importance and are considered to be an index to total function.

The qualities of the tissues manifest in an area of the musculoskeletal system sensed by the palpating hand of the physician and described by him as tone, tenseness, rigidity, relaxation, pitting, resistance, turgidity, flaccidity, coolness, heat, moistness, dryness, slickness, roughness, et cetera, combine to form what may be called tissue texture. Tissue texture varies in an area from time to time; it varies also in different areas at a given time. Because of these detectable differences and by the same reasoning that changes in the character of mobility are assumed to be a criterion of total function, changes of tissue texture are also assumed to be an index of total function and of importance in diagnosis.

Equipped with the ability to detect and evaluate variations and changes in mobility and tissue texture, the physician learns to diagnose deviations of function of any specific part of the musculoskeletal system. The deviations or aberrations so detected may be called osteopathic lesions and are so considered in this paper.

The osteopathic lesion, consisting, as just noted, of several variables, must itself be considered highly variable. Each lesion is unique and may never be exactly duplicated. To be adequate to cope with this variability, a system of diagnosis and treatment must be adaptable to the finest variations in mobility and tissue texture. Functional technic fulfills these qualifications.

By an adaptation of the feed-back principle of communication as advanced by Wiener[2] in his theory of cybernetics, functional technic is applied in the following manner: One hand of the physician, referred to as the sensory or palpating hand, is placed on the lesion to be treated. The other hand, referred to as the motor or moving hand, is placed in a position either on the lesioned part or on a neighboring part, which when moved changes the qualities of mobility and tissue texture. Communication between the two hands is by means of the physician's nervous system, which receives the sensations and, depending on previous experience, interprets them in a way to cause appropriate action by the motor hand. This motion in turn causes new sensations to arise under the sensory hand, which in their turn become the basis of further action. This cyclic process continues as long as the tissues of the patient indicate a state changing for the better, sensations arising from the tissues of the patient continuously indicating the direction, exact amount, and speed of motion required to improve function. It is true that some older physicians indicated the use of a dynamic process when they said, "Do what the body tells you to do," long before Wiener analyzed the feed-back mechanism, but the theory of cybernetics makes lesion correction more understandable and teachable.

It is assumed that the parts of the body are so related that they adjust their functions harmoniously so that the whole body functions in an optimum steady state, a reciprocal and homeostatic balance. This constant adjustment permits the body to function optimally as a unit. Functional technic utilizes to the full the tendency of the body to change toward this optimum steady state of unitary function.

Correction by functional technic of the musculoskeletal aberration, a specific osteopathic lesion which is interfering with the ability of the body to adapt adequately to demands made upon it, follows this procedure: Some tissue in the aberrant part is chosen as an indicator. This chosen tissue, a bone, a muscle fiber, or other indicator, is moved to the state of least irritation and bind attainable under the existing aberrant conditions, a state characterized by the greatest ease of motion and most normal tissue texture possible under the stress which maintains the lesion and prevents normal function. This condition of least irritation may be called the easy or functional neutral state. It may be found by balancing the part at the point of least tension between its physiologic motions. During the corrective process, this easiest state attainable, functional neutral, is maintained by moving the part in the manner that its functional changes indicate. This process is continued until there is no further improvement of mobility or tissue texture. When improvement ceases, it may mean either that the functional neutral state has not been maintained, a condition which stops the progress toward normal, or that the process is complete for the time being.

The changes in mobility and tissue texture detected by the sensory hand of the physician indicate what motions the moving hand of the physician must make in order to maintain the state of functional neutral so that the process may start and continue to a successful conclusion; that is, the correction of a specific lesion. The physician may supply the motive force through his moving hand or the homeostatic tendency of the body may autonomously cause the part to seek the state of least stress, the easy steady state. This latter force, the tendency of the body to seek normal, seems to be the more accurate force and, therefore, should be the one used unless there is indication to use other forces.

If technic is to be functional, a disturbance of function must be evident which will indicate the point at which to start in treating the patient. Random treatment of lesioned areas or sequential proceeding from

one anatomical area to another, treating lesions as found by structural criteria, may be disappointing both in lack of benefits and in time consumed.

Each individual develops as his best response to the stimuli of stresses and strains a basic postural pattern consisting of many configurations or patterns of lesions superimposed one upon another, each complicating the previous pattern. This basic lesion pattern, developed to meet accustomed physical activity, may be subjected to unusual or sudden strains greater than can be borne physiologically, so that the pattern may be broken at one or more points. In a broken pattern a new lesion occurs at a point where a pre-existing lesion existed with definite structural and functional characteristics.[4] The new lesion now gives the area of the break in pattern its own characteristics and in so doing more or less obscures, but does not remove, the characteristics of the lesions preceding it. Complication does not stop with the area of the break in the pattern. Further changes of pattern and lesion formation follow as compensation. The body as a unit reacts to maintain a state of reciprocal functional balance in the presence of gravitational and postural stresses. In contrast with a simple lesion, which is the one that first occurs in an unlesioned area, the lesion at the break in the pattern where lesioning already exists is called a complicated lesion. The break in the pre-existing pattern becomes the start of a new pattern superimposed upon all pre-existing patterns and modifying all lesions throughout the body because the new complication requires an adaptation or compensatory change in every function in the individual as a whole.

In the resolution of complicated lesions and lesion patterns, experience teaches that the least traumatic and probably the most effective method consists in accurate restoration by functional technics of whichever of the previous patterns may prove adequate, or if none found seems adequate, to build a new postural pattern. This would seem to require a reversal of the tension sequences that produced the complicated lesions and patterns. Correction is accomplished by reversing the process which produced the most recent complication. Specifically, if the break in the pattern has been caused by the motion of extension resulting in a persistent complicated lesion, motion into flexion tends to restore the previous functional state.[5] Lesions and the correction of the functional aberration are usually more complicated than this example indicates, but it illustrates the basic idea in functional correction of a specific lesion.

The lesion with which to start restoration of function can be discovered by finding either the point of the recent break or the area of maximum strain from forces at work compensating for the break. The area of maximum irritability of the patient's tissues is thought to indicate either the break in the pattern or the point of strain compensating for the break. This area of maximum irritability may be detected by various means; the quickest, most easily accomplished, and, I believe, the best is the use of the sudomotor and to a lesser extent the vasomotor reactions as indicators. Both clinical experience and research[6] corroborate the view that the amount of skin perspiration and, to a lesser extent, temperature changes are accurate indications of the relative irritability of the lesion as compared to nonirritated areas.

To locate the point of greatest strain or the break in the pattern, the area is found in which moisture causes the greatest drag to the moving finger-pad of the physician. There may also be a temperature elevation noted by the lightly stroking finger. This most irritable area is treated by functional technic until the reflexes are quieted to the point where the moisture in that area is no greater than in contiguous areas and temperatures are equalized. Though tests based on relative response of the area by forcing its physiologic motions have long been used to detect the part to treat first, I find the reflex indicators more reliable. With this exercise of some care in distinguishing between the traumatic reaction and that caused by reflexes from visceral irritation,[7] the sudomotor and vasomotor reflexes seem the most useful means of locating the area at which to begin treatment.

After the first lesion is quieted a similar process of discovering and quieting successive most irritable lesions is followed until the body indicates that no marked areas of irritation remain. Treatment ceases when it is judged from the absence of marked irritation that the patient is functioning as efficiently as possible at the time and under the circumstances.

Functional technic, carefully applied, develops a highly specific, nontraumatic and well-controlled means of treating osteopathic lesions. Because the tissues in the aberrant part are improved in function so that physiologic action becomes progressively normal, the body tends to maintain the improvement.

Part II: A teaching method

The functional technic of correcting a specific lesion is easily communicated. However, physicians already skilled in manipulation by commonly used structural methods may experience difficulty because the language in which they have learned to think and the actions which they perform are based almost entirely on structural and static concepts. Students who know no technic at all learn more readily because preconceptions and habits interfere less with their functional understanding.

The teaching method developed by the Puget Sound Academy of Applied Osteopathy endeavors to establish, prior to description or definition, a clear understanding of the technic on the touch-perception level. After the process has been felt as directed, the words used are understood in terms of a common experience and have for instructor and learner a similar value. On trial at the Northwest Osteopathic Convention and at the annual convention of the Academy of Applied Osteopathy in 1955, the touch-perception method proved more effective than the usual methods in creating a common understanding, as it already had in smaller groups and with individuals.

The procedure of the touch-perception method is as follows: The learner is told that he is to perform three experiments to determine the function of the clavicle, a bone chosen to demonstrate functional principles because of its accessibility and the ease with which it may be palpated.

The first experiment is designed to find the answer to the question, "Does the clavicle move in a definite and predictable manner when demands are made upon it by definite movements of an adjacent part?" The learner is then instructed how to attain a reciprocal balance between the adjacent humerus and the clavicle by use of the feed-back principle, previously explained. Balance is achieved by moving the humerus to a functionally neutral state or state of greatest ease between all of its physiologic movements when the clavicle will also be in a similar state of ease, since it is being used as the indicator of reciprocal balance between the

humerus and itself. In that state of ease or reciprocal function any physiologic movement of the humerus is found to produce a corresponding and predictable physiologic movement of the clavicle. This answers in the affirmative the question as to its movement in a predictable manner. Since the person who cannot feel this effect is a rarity, a common understanding based on actual experience prevails. It becomes clear to the learner what is meant by the sensory or palpating hand, the motor or moving hand, feed-back, physiologic movements, the functional neutral state, and reciprocal balance and motion. A very light palpation and a way to interpret and react to sensations are learned and practiced.

The second experiment is designed to answer the question, "Are there differences in ease of motion and feeling of tissues of this clavicle when it is caused to move in different physiologic motions?"

The learner is now instructed to move the humerus from the neutral state of reciprocal balance with the clavicle, in its various physiologic motions, one by one. He notes not only that the clavicle moves at the same time the humerus moves, as discovered in the first exercise, but that the quantity and quality of movement may be different in different directions. In some directions there may be bind or lack of ease, whereas in another direction the opposite conditions may be experienced. Also tissue texture, the sensation picked up by the palpating hand from the tissues over and around the clavicle, gives an added diagnostic quality. Either motility or tissue texture, or both, may be used as the criterion.

There are few who cannot distinguish between the sensations caused by different motions and who cannot answer the second question in the affirmative. In this experiment the learner comes to a sensory understanding of the terms "bind" and "ease of motion," which is basic to the ideas of aberration of motion. He notes differences of motility and of tissue texture when present, and he trains his sensory hand, resting lightly on the clavicle, to detect these differences as his motor hand produces changes by moving the reciprocally balanced humerus.

The third experiment is designed to answer the question, "Can differences of ease of motion and tissue texture be changed by moving the clavicle in certain ways?" Providing he has found that he can detect differences in ease of motion and changes in tissue texture in the previous experiment, the learner is now taught two distinct methods of answering this third question, both of which achieve similar results.

In the first method he is told to move the humerus from the state of neutral, found by arriving at a reciprocal balance with the clavicle, in the one way that was found in the second experiment to decrease bind of tissue and increase ease of motion. This motion he continues slowly and gently, until he comes to a point where the bind in the clavicle increases and ease of motion decreases. Maintaining the reciprocal balance or functional neutral, he then finds another motion which when followed decreases bind and increases ease of motion. This process of repeatedly finding the one motion improving ease and following it until the sensations indicate that the motility and tissue texture no longer improve is continued until no new motion can be found to improve tissue texture and all physiologic or normal motions display similar ease of motion and tissue texture.

In the second method, another clavicle is used, for the one which has been manipulated no longer displays the aberrations or differences of motility and tissue texture necessary for the experiment. The learner, in the first part, exerted a coercive force, through the moving hand on the humerus, causing the clavicle to move. In the second part he is instructed to follow passively the motion of the clavicle felt by the sensory hand and produced by the homeostatic forces of the body as they attempt to achieve a steady state. The moving hand keeps the humerus and clavicle in a continuing state of reciprocal balance throughout the process by responding to each movement by the clavicle with a corresponding movement of the humerus. This process is continued through one or more movements until the clavicle ceases to change spontaneously to a state of greater ease and the tissue texture no longer improves. The experiment is now complete. When tested, all physiologic movements are free and tissue texture is normalized.

Most learners find that they can answer the third question affirmatively, following either method. They are now able to change the aberrant motion and abnormal tissue texture found in the second experiment to free physiologic motion and normal tissue texture, either by coercion, which directs the clavicle along courses indicated by sensations caused by changes of the clavicle and its surrounding tissues, or by allowing the homeostatic forces of the body to seek a balance exhibiting less stress and better function. The latter process is permitted by maintaining the clavicle in a balanced or functionally neutral state.

After completion of the three experiments the student realizes or is told that the aberrations of motion and tissue texture which he noted in the second experiment are characteristics of and may be used in defining an osteopathic lesion. He learns that in the process of arriving at more nearly normal physiologic motion and more nearly normal tissue texture in the third experiment, he has changed for the better or corrected the lesion. He now has the basic understanding in his fingers, if not the skill, to diagnose and to correct by functional methods any musculoskeletal lesion in any part of the body which is susceptible to correction. On the basis of what he has felt, he may now proceed to the understanding and detection of simple and complicated lesions. Detection of lesions superimposed upon older patterns is a natural sequence in comprehension. After this it is easy to understand the demonstration of treatment in different areas of the body that concludes the experimental program.

Part III: Aids in application

Although the foregoing description of the functional technic of lesion correction may seem highly technical as presented, learning the simple method of correction of a specific lesion just described is not too difficult and may be accomplished in a short time. The art of treatment, however, may be difficult and require a long time to learn. Moreover, learning it may be seriously blocked by previously learned skills that employ an almost diametrically opposed approach. A partial understanding of the process may also be a block to its effective use. The following observations, recorded from experience, may help in avoiding such blocking:

The most difficult part of this learning process is thinking and acting in terms of function.

With most beginners palpation is too heavy. The touch of the sensory hand must be very light.

Motion is usually too fast and too great in extent.

The moving hand must be curbed.

The moving hand is likely to be wrongly used to detect bind of tissues and ease of motion via proprioceptors. The moving hand should be used for motion only. While this is true and the beginner must be careful to develop his ability to feel with the sensory and move with the motor hand, it is also true that as he becomes more proficient he must use his two hands alternately, if not simultaneously, as sensory and motor agents to follow the process of changing reciprocal balance in which both parts of the patient in contact with the hands are simultaneously moving toward a different and more efficient functional relationship.

Relaxation and balance are necessary in both physician and patient. Slumping of the patient defeats the technic. He should be like a horseback or bicycle rider, in balance. Under balanced conditions, functional technic is ordinarily pleasant to the patient and requires relatively little physical strain on the part of the physician, though it does require a high degree of concentration.

If an area seems refractory and there is difficulty getting desired results, tension from another area of a more recent pattern may be interfering. If so, this holding tension must be sought out and released; then, if still necessary, the first site may be treated.

The tissue changes in lesions will not be corrected immediately by the quieting of reflexes, but the change effected is enough to start the process toward normalization. In most cases it is not necessary to do more than quiet the area to start a reversal of the pathologic process, whether acute or chronic. Pathologic changes in the lesion are evidence of the time factor in the living process and require consideration in treatment and prognosis.

If marked functional changes occur in response to a given treatment the patient should be warned that he may become lame from the new activity of the tissues. The treatment itself is not likely to traumatize.

If a painfully acute area is relieved, it is well to tape it for support and prevention of overactivity. This is especially true of acute low-back strains which often seem miraculously cured as the pain ceases but which are still in an inflammatory state. Tape is also used to maintain new functional states until muscles and ligaments adjust to their altered function.

Functional technic can be applied with the patient in any position and with almost any deformity. It is seldom that some part cannot be balanced with the part in lesion, no matter how and where we find the patient or how little he may be moved.

Functional technic utilizes to the full the tendency of the body to change toward the optimum steady state of unitary function

Functional technic may be applied to every case in which corrective manipulation is indicated. Many emergency cases respond to manipulative technic, either functional or structural, more readily than to other therapy.

Functional technics yield best results when the physician uses them to put into action the osteopathic theory of body tendency toward normal rather than as a mere orthopedic or corrective procedure. If the scope of functional technic is not totally understood and carefully applied, treatment is likely to prove disappointing and judgments of the value of the technic based on results are likely to be fallacious.

One of the physiologic motions of any part is that of respiratory rhythm. If the patient is taught to breathe deeply and without strain while being treated the technic is likely to be more effective and less time-consuming.[8]

If during the process of correction by either method described in the third experiment the reciprocal balance is lost, it is necessary only to re-establish the balance relationship and proceed. This can be done by again finding the functional neutral between all physiologic movements, from which state the process continues as before.

Treatment under the condition of minimal tension, established by first finding the neutral of all physiologic movements of a part, permits the most accurate and probably the best correction. However, if conditions do not permit this ideal or the physician wishes to do otherwise, two aberrant points may be balanced against each other, under tension, and the correction accomplished in the presence of the added stress. Correction under stress, when the parts are not permitted easy motion, takes longer, frequently requires much force, and is not as accurate, but, as stated, it may be desirable in certain conditions. This latter method is frequently confused with true functional technic.

Any aberrant tissue may be used as the indicator for the sensory hand. In the shoulder experiment, the deltoid muscle, the ligaments at the acromioclavicular joint, or any related tissue showing palpable abnormality of motion or texture may be used to indicate the necessary changes.

A knowledge of the physiologic movements of a part, while not necessary to those who can invariably sense what the tissues are telling, is of great value to those who have not developed this ability. However, one must recognize a danger of defeating the purpose of treatment by using the knowledge of the physiologic movements to produce motions based on preconceived, possibly erroneous diagnosis, rather than permitting motions based on the sensations fed back from the tissues, which inevitably lead to the desired results. We are prone to think of physiologic movements in terms of position of structure in which traditionally they have been defined rather than in terms of the functional activity which the words imply.

Time is spent to no advantage by dwelling on lesion patterns as such. What is important is to work toward a pattern which permits better function. Quieting irritation at stresses and breaks leads to this objective.

The theory of patterns and complicated lesions explains why one may treat an area of lesion and quiet it only to find he must sometimes return to it to quiet it again after other lesions are changed.

The mere discovery of a lesion does not warrant an attack upon it. Treatment when not indicated, out of proper sequence, or too much or too little may bring

harm rather than benefit, or at best the benefits may be diminished. There must be specific indication for treatment and no contraindication.

Part IV: Technic of the future

From experience it is believed that functional diagnosis and correction of the osteopathic lesion can be taught so that few in the osteopathic profession or in related disciplines who are open-minded and who are endowed with ordinary faculties can misunderstand or deny the existence of the functional aberration known as the osteopathic lesion or its eventual alteration or correction when treated. This makes functional technic useful in teaching the neophyte; it dispels the skepticism which he does and naturally should have. He need not, as he is often forced to do now, because structural diagnosis and treatment are difficult to learn, take the word of the instructor about the characteristics of the part being diagnosed, the method of change, and the state of the part at the conclusion of the correction. In functional technic the criteria are not difficult to apply and evaluate.

A question may arise as to the interpretation of the corrective process, since what actually happens in the tissues of a lesion under the surface is not felt but what is felt by the physician is sensation arising from changes which must be recognized and evaluated. This doubt need not block the learning of functional technic. A more normally moving part surrounded by tissues having an improved texture, a state which has been predicted, is not hard to recognize. If such a desirable state can be produced without explanation as has been done in experimental teaching, the greatest skeptic, if he will follow directions, can achieve excellent correction of specific lesions while looking for an explanation of what happens.

Questions as to the subsequent effect of the changes on the local area treated and on the patient as a whole may, however, be more pertinent. Does the technic actually achieve greater and more worth-while improvement in the patient's health?

Despite the fact that structural technics have proved their worth for years in osteopathic practice, experience seems to teach that functional technic, when indicated and properly used, achieves more predictable and lasting improvement in the health of the patient than any other corrective technic of which I am aware.

Also eventually and inevitably one is led by experience with functional correction to the conclusion that trained postural reflexes are an essential of total health. After and not before functional aberrations are removed, good postural training of the body as a unit becomes possible. After the patient is taught to sense the balancing mechanism used in functional technic, exercises can most easily be taught which accentuate and continue the benefits of correction.

Functional technic is presented as a developing idea. It is believed that when investigated, developed, and explained in terms of modern scientific thought so that it will be adequately applied it will lead to a better understanding of the therapeutic value of manipulation. It is hoped that it will help further the standardizing of osteopathic language since understanding can start on the sensory level and that this common understanding may be communicable to those in other disciplines the importance of which is called to our attention by Page.[9] It is believed to be a necessary step toward a fundamental improvement in manipulative technic which Page[9] states has not occurred since the turn of the century. Its teaching methods can conform to Galdston's[10] proposed reorientation of medical school curricula centered on a study of the health of the patient. By using the reactions of the patient as the basis of diagnosis and treatment, it is believed that functional technics because they are dynamic can be useful in incorporating the proved clinical effectiveness of osteopathic manipulation in the ecological or social medicine which Galdston[10] hopefully forsees, thus more fully enriching and expanding the medicine of the future with the contribution which osteopathy can make if adequately presented.

Summary

A manipulative technic for altering the musculoskeletal system based on the dynamic process of changing function directly rather than following the procedure of altering structural relationships to change function indirectly is described. Altered mobility and tissue texture are postulated as criteria in diagnosis, and the feed-back principle of modern science is advanced as useful in treatment. This new technic is presented as clinically effective in affecting the health of the patient as a whole, its application being controlled by the reaction of the body itself.

A touch-perception method of teaching lesion diagnosis and treatment, based on the reaction of the body and considered more effective than the usual methods of instruction, is presented.

It is indicated that while the functional process of lesion correction is easily learned, difficulties may arise in its application. Suggestions to avoid such difficulties are presented.

Hope is expressed that increased use of the dynamics of the body in diagnosis and treatment will further recognition of the effectiveness of manipulation in therapy and that the principles advocated may be helpful in the realization of Still's ideal of a medicine devoted to the discovery and promotion of health.

1219 Sixth Ave.

Acknowledgment

I am indebted to many persons who have helped me with this and other papers upon which this one is based. Especially I owe much to Drs. Mary Alice Hoover, Charles Bowles, Lawrence W. Osborn, William L. Johnston, and H. G. Grainger. While they do not all agree totally with this presentation of functional technic and each would say it differently, they have all helped to improve the clarity and accuracy of this work.

1219 Sixth Ave.

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Editorials

The 1956 Clinical Assembly

No location in the nation better typifies osteopathy today than does Michigan—it and its motorcar capital, Detroit. The state with its many prosperous rural areas and self-sufficient centers has made it possible for doctors of osteopathy to demonstrate their worth as "general physicians," the term so fittingly applied to the general practitioner by the President's Commission on the Health Needs of the Nation, 1952. At the same time the fifth city in America with its growing galaxy of osteopathic hospitals, pioneered by the Detroit Osteopathic Hospital, reveals the osteopathic physician as well-fitted to assume his share of caring for the health needs for a great metropolitan population.

The Clinical Assembly well exemplifies the Physician and Surgeon, D.O. Although the majority of those in attendance are specialists within one of the four fields of osteopathic medicine represented, many have had a wholesome period of development as general practitioners. Conversely the general practitioners attending emphasize a particular area of medical care within the total field in which they practice. The four groups of doctors that make up the Clinical Assembly are generally known—they are the surgeons, anesthesiologists, radiologists, and orthopedists. The fifth participant in the Clinical Assembly is the important American Osteopathic Hospital Association representing osteopathy's fastest growing sector and composed of our hospital administrators. Of these, some are osteopathic physicians and others are individuals technically trained and experienced in this particular managerial field.

The pattern of the Clinical Assembly is well established, and it has been so efficiently productive that an entire profession should become aware of its worth. Actually, the Clinical Assembly is five meetings within one. As an entire body, the five cooperating groups meet but once, the evening meeting of the first day's program.

The business of medical organizations is always a frustrating problem inasmuch as the machinery tends to get in the way of the goals which constitute the organization's purpose in presenting an annual scientific and clinical program. An attempt is usually made to overcome the obstacles which policy-making and executive bodies put in the way of programed meetings by holding their sessions either in the days before the programs begin or at off-hours during the meeting. Each of the five groups that make up the Clinical Assembly has done extraordinarily well in preventing its business from interfering with its professional obligation as a scientific gathering. However, to this observer, growth of each participating organization of the Clinical Assembly is resulting in an emerging problem similar to the one apparently insoluble to the Annual Convention of the parent body of the profession—the American Osteopathic Association: There is too great an absence of leaders from the program sessions.

In addition to the business meetings held by the governing bodies of each participating group, two of the profession's eleven boards of specialty certification met prior to the convening of the Clinical Assembly. As a matter for clarification, it should again be emphasized that A.O.A. boards of specialty certification are not bodies within the organizational structure of specialty colleges. The membership of specialty certification boards, however, is usually provided by "the election of certified specialists by the . . . corresponding specialty colleges or societies." The specialty certifying boards are a part of the method by which specialty certification in a given field of osteopathic medicine may be finally achieved by a doctor of osteopathy through an official action of the A.O.A. Board of Trustees. Although specialty certification is in no way connected with the Clinical Assembly, the Assembly is so largely a meeting of specialists that the program by which the individual doctor finally becomes a certified specialist should be thoroughly understood.

Opening Program

Within a well-established tradition, the president of the American College of Osteopathic Surgeons, Dr. J. Donald Sheets, called the 1956 Clinical Assembly to order at 7:30 p.m., October 28, in the Grand Ballroom

of the Sheraton-Cadillac Hotel, Detroit, Michigan, the official hotel for the Assembly. For the College of Surgeons it was the twenty-ninth such call; for the Assembly as a coordinated group meeting, it was the sixth. Seated on the platform with Dr. Sheets were the presidents of the participating organizations; they were Dr. George B. Hylander, York, Pennsylvania, College of Radiology; Dr. Karl P. B. Madsen, Oakland, California, Academy of Orthopedics; Dr. William A. Gants, Providence, Rhode Island, College of Anesthesiologists; and Mrs. Alixe P. Nuzum, Des Moines, Iowa, Osteopathic Hospital Association. The Rev. Charles E. Coughlin, Pastor, Shrine of the Little Flower, Royal Oak, Michigan, delivered the invocation, and Mr. George Romney, president of the American Motors Corporation, gave the address of the evening. The Hon. G. Mennen Williams, Governor of Michigan, and Dr. Robert D. McCullough, President of the American Osteopathic Association, spoke briefly.

Trenery Lecture

Although the Trenery Lecture is a special function of the College of Radiology, it is becoming an event of the entire Clinical Assembly. Time-connected with the Assembly's opening exercises, which it follows, the Lecture is one planned by the radiologists as a challenge to all physicians attending the Assembly regardless of their specialty, and with an interest for all registrants.

This year the Lecturer was invited from within the College of Surgeons and was the well-known Dr. James M. Eaton, Philadelphia, a past president of the College of Surgeons, an osteopathic educator of note, and a distinguished orthopedic surgeon. Our readers will recall that the Trenery Lecturer each year is presented with the bronze Trenery medal—this year's presentation was the fourth to be awarded since the initial medal was struck from the die in 1953 for presentation to Mrs. Floyd B. Trenery, the widow of Dr. Trenery. The 1956 Lecture, however, was fourteenth in the series. Dr. Eaton was introduced by Dr. Paul T. Lloyd, Philadelphia, a long-time colleague of Dr. Eaton as well as a colleague and friend of Dr. Trenery. The Lecture, "The Radiculodisk Problem," is scheduled to be published early next year in THE JOURNAL.

Scientific Programs

Preceding the opening program of the Assembly and the Trenery Lecture, the College of Radiology had completed its first day's program; the Academy and the Hospital Association had each finished a half-day's session. Monday, October 29, opened a full-day program for all groups. An advantage of the Clinical Assembly type of meeting is the opportunity it affords for joint meetings, either of a formal type as that of the radiologists, orthopedists, and surgeons, with papers presented on "The Hip Joint—Puberty to Adult," or for a specialist from one group to appear before another to discuss some aspect of his own particular field of practice. The panel technic was used effectively in all programs.

College of Surgeons

The program session of the surgeons was opened on Monday, October 29, at 9 a.m., immediately following a 45-minute members' session. The 1956 program, built by Dr. Don E. Ranney, Detroit, and an experienced program committee of six additional members of the College, was a varied one. It differed from those of recent years in that there were no guest speakers from without the osteopathic profession, although there were several guest speakers from within it—evidence of the breadth within our own profession's specialty fields. The closing program of the College, presented Thursday morning, November 1, consisted of a surgical forum in which a member from each of the participating professional colleges took part, augmented by two guest panelists, Dr. Sidney F. Ellias, chairman, Department of Medicine, Art Centre Hospital, Detroit; and Dr. Norman W. Arends, director of laboratories, Detroit Osteopathic Hospital, Detroit. Dr. Ellias and Dr. Arends are members of the College of Internists and the College of Pathologists, respectively.

The Ceremonial Conclave of the College preceded by the annual banquet, at which all registrants of the Clinical Assembly are guests, was held in the Grand Ballroom of the Sheraton-Cadillac Hotel. The Conclave is a social and ceremonial event, the formal part centering around the address of the president, the inauguration and address of the incoming president, the award of the Degree of Fellow, presentation of the new members of the College, bestowal of life membership awards, and the presentation of the Orel F. Martin medal. These are the outstanding sections of a richly formal and highly ritualistic service—one seriously presented and appreciatively received by the guests.

Life membership was granted to a distinguished woman surgeon, Dr. Margaret Jones, Branson, Missouri, a Fellow of the College, who is now retired. The Degree of Fellow was bestowed upon the following members of the College of Surgeons: Drs. Warren G. Bradford, Dayton, Ohio; W. Don Craske, Chicago; Rufus A. Davis, Long Beach, California; and Robert F. McBratney, Los Angeles. It was bestowed upon associate members, Basil K. Woods, Glendale, California; and Charles J. Karibo, Detroit. Dr. Karibo is a certified radiologist, and Dr. Woods is a certified pathologist. The highest award within the College's province is that of the Orel F. Martin medal, this year awarded to Dr. John P. Schwartz, Des Moines, Iowa, a past president of A.C.O.S. and a distinguished surgeon and osteopathic educator. Dr. Martin was absent because of illness, being confined to his Florida home. His own place in the College of Surgeons and in the profession was bespoken by the creation of the medal in 1953.

The 1956-57 president of the College is Dr. Harold J. McAnally, Kansas City, Missouri, well-known surgeon, osteopathic leader, and professor of surgery at the Kansas City College of Osteopathy and Surgery. Dr. McAnally is widely known for his activities in connection with the Kansas City Child's Health Conference, now in its twenty-fifth year. The tragic death of Dr. Troy L. McHenry, Los Angeles, the 1955-56

president-elect, has become generally known. Dr. McHenry was accidentally killed on October 21, a week prior to the convening of the College. By special action of its Board of Governors, he is to be recorded in its history as a president. The president-elect for 1956-57 is Dr. Karnig Tomajan of Boston. Drs. James O. Watson, Columbus, Ohio, and Charles L. Ballinger, Toledo, Ohio, each a past president, were elected as vice president and secretary-treasurer, respectively.

Members elected to the Board of Governors were Drs. James M. Eaton, Philadelphia, to fulfill the unexpired term of Dr. Tomajan; Howard C. Baldwin, Tulsa, Oklahoma; Milton V. Gafney, Dallas, Texas; and Ernest G. Bashor, Los Angeles. Holdover members of the Board are: Drs. J. Willoughby Howe, Hollywood, California; Howard A. Graney, Des Moines, Iowa; Howard E. Lamb, Denver; Howard B. Norcross, Los Angeles; J. Gordon Epperson, Oakland, California; Don E. Ranney, Grosse Point Woods, Michigan; and J. Donald Sheets, Highland Park, Michigan.

The closing evening of the Assembly was given over to a banquet and popular entertainment for all guests, termed the "Car-ni-val."

Again, the visual education program proved popular. Color films depicting surgical operations were presented daily through the courtesy of Davis and Geck, Inc.

Urologic Section

Members of the College specializing in urologic surgery held a highly successful meeting, presenting their own special program. For organizational purposes the section has its own group of officers. For 1957 these are the chairman, Dr. George F. Scouten, Long Beach, California; the vice chairman, H. Willard Sterrett, Jr., Philadelphia; and the program chairman, Robert E. Rheinfrank, Tulsa, Oklahoma.

Academy of Orthopedics

The Academy program is always rated as one of special interest and practicality. It is a varied group, and its leaders plan a program of genuine teaching value, especially to its younger members. During the Academy's annual membership and installation meeting, held on Tuesday, October 30, special recognition was made of the services of Dr. Edward T. Abbott, Los Angeles, to the entire osteopathic profession. Dr. Abbott, who has recently completely recovered from a long and serious illness, was present to receive the honor.

At this meeting Dr. John M. Wright, Toledo, Ohio, was elected to succeed Dr. Karl P. B. Madsen as president. Dr. J. Paul Leonard, Detroit, the Academy's experienced secretary-treasurer, was re-elected. Program chairman for 1957 will be Dr. Donald C. Siehl, Dayton, Ohio, and for 1958, Dr. Arthur E. Miller, Los Angeles. Two new members were elected to the Academy's governing body, its Board of Directors —they were Drs. Harold E. Clybourne, Columbus, Ohio, and Charles H. Brimfield, York, Pennsylvania. The holdover directors are: Drs. Karl P. B. Madsen, Oakland, California; Walter R. Garard, Los Angeles; Thomas T. McGrath, Kansas City, Missouri; C. Robert Starks, Denver; Arnold Gerber, Philadelphia; and Robert O. Fagen, Pontiac, Michigan.

Hospital Association

The Osteopathic Hospital Association grows apace, outdistanced only by the increasing number of the profession's new institutions. Of the five Assembly participants, the Association, aside from those doctors of osteopathy who serve as administrators of hospitals, is a group from without the osteopathic profession, but one not in any way exceeded in dedicated and devoted interest to the profession by organizations made up exclusively of osteopathic physicians. The attendance is large at all Association sessions, and registration ranks among the highest in number of any of the groups. Because of the special interests of its members, the Association holds its own banquet at the same time that the Conclave of the College of Surgeons is being held. This year's Association program was enriched by guest speakers, each especially qualified to speak on some phase of hospital administration. Among these were Mr. Walter J. McNerney, a director and associate professor of the Program in Hospital Administration, School of Business Administration, University of Michigan; Mr. Everett W. Jones, vice president of the Modern Hospital Publishing Company and a regular lecturer in hospital administration at Northwestern and the University of Chicago; and Mr. Roy Johnson, a member of the teaching staff at Northwestern University's School of Hospital Administration. A number of panels were scheduled as a part of the program, and opportunity was given for questions and discussions among attendants. The program was in charge of Mr. Philip Rosenthal, Philadelphia.

The following officers were elected for 1956-1957: president, Mr. Rosenthal; president-elect, Mr. Heber Grant, Burbank, California; first vice president, Mr. Irvin J. Biggs, Denver; second vice president, Mr. George Fuller, Jr., Kansas City, Missouri; secretary-treasurer, Mr. Philip Vicari, Grand Rapids, Michigan; 1957 program chairman, Mr. Grant. The executive-secretary, Mr. R. P. Chapman, Davenport, Iowa, was re-elected. The Association's immediate past president is Mrs. Alixe P. Nuzum, Des Moines, Iowa. New members of the Association's governing body, its Board of Trustees, are the following: Dr. George C. Wolf, Lancaster, Pennsylvania; Mr. John C. Zemke, Mt. Clemens, Michigan; Mr. E. L. Herbert, St. Louis; Miss Kathleen Q. Sumption, Seattle; Mr. Fred H. Dilley, Jr., Roswell, New Mexico; and Mr. David W. Lawrence, Long Beach, California. Holdover members of the Board are: Miss Lois Beane, Bangor, Maine; Miss Sylvia Frumkin, Miami, Florida; Mr. R. A. Lease, Bay Village, Ohio; Mr. A. C. Parmenter, Des Moines, Iowa; Mr. L. C. Baxter, Tulsa, Oklahoma; and Dr. Merle Griffin, Corpus Christi, Texas.

During the annual banquet, recognitions and awards were made. Among these were the past president's plaque to Mr. Keith Bowker, Flint, Michigan, and an award of merit given to Dr. Griffin and Miss Beane.

A small group of long-experienced hospital administrators—the College of Osteopathic Hospital Administrators—working with highly developed technics of hospital management, met for the fourth time, prior to the meeting of the Association. This particular group is exploring the more complex phases of the hospital administrator's responsibilities. Its officers for the coming year are: President, Mr. A. C. Parmenter, Des Moines, Iowa; vice president, Mr. Paul L. Reimann, Cranston, Rhode Island; secretary-treasurer, Mr. R. P. Chapman, Davenport, Iowa. The immediate past president is Mr. Heber Grant, Burbank, California. Its governing body consists of a five-man Board of Trustees —all holdover members from the year just ended. These are: Mr. Philip Rosenthal, Philadelphia; Mr. George Fuller, Jr., Kansas City, Missouri; Mr. Irvin J. Biggs, Denver; and Mr. B. A. Sumner, Los Angeles.

College of Anesthesiologists

For the third year this group of specialists met as a specialty college, the successor to the Society of Anesthesiologists which was dissolved in November 1953. A first attempt made in the early 40's by a small group of anesthesiologists to organize within osteopathic medicine proved abortive; a second move was begun in 1947 and successfully consummated in 1949. As an organization, these specialists have been plagued by fewer growing pains than almost any other similar body—they profited by their unfortunate earlier experiences and by the organizational mistakes of other specialty colleges. From its first meeting as a society the group produced a good program; its first JOURNAL supplement, October 1952, was of high quality. In 1956 the College program again set for itself a new high standard of excellence.

Guest speakers from without the profession included Oscar Begman, M.D., pulmonary physiologist, Herman Keifer Hospital, Detroit; John P. Garvin, M.D., assistant director, Department of Anesthesia, Children's Hospital, Columbus, Ohio, and an assistant professor of surgery (anesthesia), Ohio State University; and M. L. Axelrod, D.D.S., long-known in medical circles generally for his contribution to the practice and teaching of anesthesiology. From within the osteopathic profession guest speakers included: Drs. Neil R. Kitchen, Detroit Osteopathic Hospital, Detroit, certified in internal medicine; Floyd E. Dunn, well-known psychiatrist, chairman, Division of Neurology and Psychiatry, College of Osteopathy and Surgery, Kansas City, Missouri; and Dr. Lloyd A. Seyfried, senior otolaryngologist, Detroit Osteopathic Hospital, Detroit. Officers of the College for 1956-1957 are: president, Dr. Mahlon L. Ponitz, Huntington Woods, Michigan; president-elect, Dr. Claire E. Pike, Long Beach, California; and vice president, K. George Tomajan, Boston. Dr. Crawford M. Esterline, Kirksville, Missouri, the group's devoted and efficient secretary-treasurer, was re-elected to that office. Dr. Lawrence Everett Giffen, Jefferson City, Missouri, was elected as program chairman for 1957, and Dr. Charles A. Hemmer, Lansdowne, Pennsylvania, was made program chairman for 1958. New members of the Board of Governors are: Drs. Harry J. Petri, Jr., Portland, Maine; and J. Calvin Geddes, Mt. Clemens, Michigan. Holdover members of the Board are Drs. J. Maurice Howlett, Birmingham, Michigan; J. Craig Walsh, Philadelphia; Robert L. Thomas, Columbus, Ohio; and John S. Stratton, Alhambra, California. The immediate past president is Dr. William A. Gants, Osteopathic General Hospital of Rhode Island, Providence, Rhode Island. The 1956 program chairman was Dr. Leon D. Lasser, Detroit.

College of Radiology

The College acknowledges two of its obligations to be especially binding. The Trenery Lecture is planned that it should be not less than a significant event; just so, the entire program is built to conform to an ideal of the College that it be a teaching group. For its older and experienced radiologists, the meeting makes possible an exchange of professional experiences in all areas of the specialty; for its associate members, papers and discussions are presented at a level which will enrich their knowledge of technics.

The annual Tuesday night banquet is informal in nature, a social hour combined with expressed appreciation for the services of retiring officers and a brief ceremony of installation for new officers. This year recognition was made of a change in the professional life of Dr. Clyde Henry from that of a radiologist to the position of Director of Hospital Inspections, Bureau of Hospitals, American Osteopathic Association. Both Dr. and Mrs. Henry were extended the best wishes of his colleagues.

Dr. George B. Hylander, York, Pennsylvania, succeeded Dr. A. G. Reed, Tulsa, Oklahoma, as president; Dr. Edward P. Small, Detroit, the 1955 Trenery Lecturer, was made president-elect, and Dr. Charles D. Ogilvie, Dallas, Texas, was elected vice president. Dr. Small will be the program chairman for 1957. Dr. F. A. Turfler, Jr., South Bend, Indiana, was re-elected secretary-treasurer. An executive committee acts as the governing body for the College and to it are elected Drs. Preston M. Wells, Lansing, Michigan, and Dr. Ogilvie. Holdover members are Dr. John H. Pulker, Flint, Michigan, past president; and Drs. Reed, Hylander, Small, and Turfler. Members at large are Drs. Charles L. Curry, Fort Worth, Texas, and Jesse P. Oswald, Oakland, California.

Resume

The Clinical Assembly is but one of a number of national program meetings of specialists within osteopathic medicine, programs in themselves that bear witness to the breadth of its coverage. They attest that the osteopathic profession is one of the two healing art agencies in America which provide a complete health service for its people. Because the Assembly is a concentration and coordination of five different groups, it exhibits more dramatically and effectively the evidence than does a meeting of any one single specialty group.

The Clinical Assembly also illustrates the worth of numbers in the light of our profession's smallness. As a national meeting it establishes the fact that professional divisibility based on special technics and skills

need not make segregation and isolation of ourselves inevitable. So successful a meeting as the Clinical Assembly puts life into an old question. How can the osteopathic movement in medicine maintain its sense of organizational unity when osteopathic medicine is scientifically, philosophically, and technologically broken up into the many components characteristic of modern medicine? Osteopathy as a movement is indivisible. It must be kept so if it is to meet fearlessly the increasing challenges thrown down by a society it is called upon to serve. THE JOURNAL has previously stated that the profession's leaders, although speaking as individuals, are of one voice in declaring that the question of maintaining effective organizational unity is an agonizing one. How can osteopathy maintain the technical divisibility inherent in healing art groups and at the same time preserve its organizational unity? Only effective organizational integration can guarantee a vitally living body to the osteopathic profession.

Meetings of its national bodies are a continuing revelation of the individual strengths within osteopathy, which taken together could afford a mass base able to reckon with numerical weaknesses. The fact is well illustrated by the Clinical Assembly in action.

The problem of organizational fractionation in osteopathy therefore becomes a responsibility of the parent body (A.O.A.), its affiliated groups, and the individuals that make up the profession—a responsibility that they dare no longer brush off. Too often it has been swept under the rug. To keep it there means eventual dissolution. When osteopathy as a movement becomes actually divisible, not merely apparently so, it will be too late—then all the king's horses and all the king's men will be to no avail. The strengths of this profession—and they are manifold—but expose its weaknesses.

Your questionnaire is a link

The profession-wide statistical survey has moved into its period of true testing. Initially, it has been a success. Hundreds upon hundreds of doctors responded promptly; their questionnaires are now in the A.O.A. Central Office being readied for transferral to the IBM cards which, when completed, will constitute an entire picture of the osteopathic profession. Your national headquarters office—along with other major national agencies—will then have in full operation a mechanized statistical program that can be kept up to date.

The importance of a *complete* statistical survey cannot be overestimated. It is the profession's link—just as your questionnaire is a link in a total chain—with every sector of society and at each of its levels: federal and state governments, legislatures, military and defense bodies, numerous voluntary cooperating health groups, and other groups pledged to public welfare. While the data furnished by each osteopathic physician is personal and professional in nature, in no way will its use be personal. The importance of the individual in such a survey as this lies in the relationship that he bears to the total profession; this is a spot where the individual really counts, although his individuality is lost in the group.

It is not enough, therefore, that thus far the survey gives promise of being successful, with 56 per cent of the questionnaires now in. This statistical survey of the osteopathic profession must be 100 per cent, allowing only for the rare individual who fills out no questionnaire of any kind. The offer made in THE FORUM holds: If you have lost your blank or never received it, air mail your request for a duplicate or wire the A.O.A., collect: "Blank lost." Another will go forward by air mail.

Notes and COMMENTS

An osteopathic organization of stature

THE FOURTH GENERAL ASSEMBLY of the American College of General Practitioners in Osteopathic Medicine and Surgery held in New York City, July 16, 1956, was significant as a revelation of the growing maturity of this, one of the newer organizations within osteopathy. Its worth to the osteopathic movement and its practical value to many more doctors of osteopathy than are now members should be much more widely known. Membership figures to June 20, 1956, totaled 533, against 433 of the year previous. While the College's accreditation has been relatively slow, it has been healthy, in that its leaders have had time to re-examine and restate its purposes, push its horizons forward, and shore up its objectives as one of the more important sectors of osteopathic medicine. And all this they have done, within a growing sense of their responsibility to the total profession. The time has come to give this body the authenticity and authority that grow out of a full membership made up of those who have the right and need to be on its rolls.

Through its institution of the Award to the General Practitioner of the Year, the College has set forth in concrete form the age-old ideals of medicine, embodying them in an individual, who for the moment becomes a living symbol of medicine as a vocation of

man. While keeping alive the ideal, the General Practitioners are to be commended for their efforts to bring out into the open some of the problems that are arising in increasing number and complexity out of today's patient-doctor relationship. Their solution can no longer be based on a fee-for-service formula that worked in the simple economy of the nineteenth century. Then, medical practice was largely generalist in nature. That day is over, forever. But the three groups involved, specialists, generalists, and patients themselves, tend to shut their eyes to the facts; as a result, all those involved succeed in thoroughly misunderstanding each other.

It was to these problems that the late Dr. Troy L. McHenry, then president-elect of the American College of Osteopathic Surgeons, addressed himself in July, speaking before the Fourth General Assembly. An abstract of his talk has been published in the minutes of the Assembly, together with reports from its national officers and those of its state societies. These proceedings are now available to all the members of the College. Out of the Fourth Assembly and its records, the stature of this newer organization in osteopathic medicine begins to emerge clearly. To be effective as an organization ACGPOMS needs many more members; but much more, there are hundreds of doctors of osteopathy who need to join this group. A few of the reasons have been hinted at in this word of comment on the 1956 national meeting of the College. But readers who have never given consideration to the question of membership in ACGPOMS or who doubt their need of it should write its secretary for literature and further information. Address: Alfred J. Schramm, D.O., 5880 San Vincente Boulevard, Los Angeles 19, California.

This organization will be an important factor in promoting the advance of the osteopathic movement in medicine unless it belies the promise it shows today. The time has come for doctors of osteopathy doing a general practice and planning to continue as general physicians—and there should be many hundreds—to ask themselves not "How can the college benefit me?" but "How can I afford not to belong?"

Death of a great man, Anton J. Carlson

DR. ANTON JULIUS CARLSON died recently in Chicago at the age of 81 years. Osteopathic physicians attending the Fifty-Fifth A.O.A. Convention in Milwaukee, Wisconsin, will recall that he addressed a general session there. He was full of years, but strong and powerful beyond the measure of ordinary men at any age. Nominally he was retired—for 10 years he had been labeled "emeritus"—but for him to be retired was to be freed to fight unremittingly against quacks and quackery, antivivisection, ignorance, superstition, alcoholism, and the aging processes (the subject of his A.O.A. talk). The totality of his impact upon American life, measured both directly and indirectly, can never be estimated—and that applies even to the osteopathic movement. There is no man's life that would not be enriched and made better by holding in his mind a thought expressed by Dr. Carlson before a meeting of the American Association for the Advancement of Science in 1952 on the question, "Does the greater understanding of man and nature increase the scientist's social responsibility?" In the closing paragraph of his address he said this, in part:

> When the shadows beckon men of my years, we still have our children, we still have our dreams. I dream of a day when our leaders will actually put the principles of science and democracy to work in our land, in politics, in industry, in trade, in education; when understanding will more than hold its own against superstition, guile, and greed, when force and violence is replaced by conference, compromise, and approximate justice in all our domestic and foreign relations. When that day is at hand in our own land, our example will be a greater impetus to the path of peace and justice in other lands, than are our present speeches, and our lend and lease of the implements of war to all democracies, and would-be democracies of the world. It is a matter of forgetting the hypothetical universe created out of ignorance and motivated by our undisciplined emotions, and a reconditioning to the actual universe as gradually understood through *controlled experience and experiment.*

Especially applicable to osteopathy is this directive, which occurs earlier in the paper:

> . . . we should apply the scientific method to our education at all levels; the scientific integrity, the scientific courage to face all the proven facts, but keep our mouths shut and our pens dry till we know the facts.

"Saturated" vs. "unsaturated" fats in diet

LAST MONTH THIS column emphasized to the clinician the importance of taking advantage of the known facts about diet in relation to proprophylaxis and therapy in atherogenetically susceptible individuals. Although the specific etiology of atherosclerosis remains unknown, blood fats appear to play a role. A study made at the University of Cape Town in South Africa lends significant support to a contention that not only fat blood but the *nature* of the high fat diet of most Americans is a leading factor in the production of vascular disorders. Dr. Norman Jolliffe, director of the Bureau of Nutrition of New York City's Department of Health, recently called attention to the Cape Town studies as pointing to saturated dietary fats as particularly harmful. Unsaturated fats seem to be less productive of atherosclerotic lesions. The problem revolves around the chemical properties of dietary fats in relation to their iodine numbers, defined by students of biochemistry as the per cent of iodine absorbed by fats. Unsaturated fish and vegetable oils have high iodine numbers; obviously saturated fats show a low percentage of iodine absorption. For example, butter fat, beef fat, and lard have low numbers, whereas cottonseed, soybean, and fish oils have high numbers. Modern solid cooking fats are frequently unsaturated fat and oils which have in the processing—for better keeping qualities or taste—become saturated. This re-

sults, Dr. Jolliffe stated, in an average American diet being made up largely of fats that tend to have low iodine value. He suggested that the American people should get less than 30 per cent of their total calories from fats, and a sizable portion of that should come from marine and unprocessed vegetable sources.

Dr. Jolliffe made certain practical suggestions that should be passed on by physicians to their patients, such as the importance of eating leaner meats, fish, and nonfat cheese. Visible fat in meat should not be eaten, fatty desserts should be restricted, and not more than one ounce of liquid oil should be consumed in a day. More full calorie foods may be consumed if it is necessary to make up for calorie deficit from fat restriction. Dr. Jolliffe emphasized especially that these strictures should be applied by the physician not only to individuals who have had coronary artery occlusion and other vascular disorders and seek to avoid a recurrence but to all who would be prudent—especially "males of voting age or the female past menopause."

Notes in briefer form

FOR 30 YEARS IT HAS been assumed that man reaches his peak of intelligence at about 21 years of age, a concept supported by intelligence quotient tests. A recent report from the Child Development Section of the National Institute of Mental Health states that repeated tests on the same persons as they grew older yielded scores that indicate some intellectual abilities may continue to increase slowly up to 50 or older. If the projected theory proved true, educational testing methods would come in for radical changes. . . . The Public Health Service recently announced that fluoridated drinking water is now furnished to one fourth of the people using public water supplies. Among the larger cities adopting this preventive dental health measure are Chicago, Philadelphia, Baltimore, Washington, Pittsburgh, Cleveland, Milwaukee, San Francisco, St. Louis, and Buffalo.

DEPARTMENT OF PUBLIC RELATIONS

CHESTER D. SWOPE, D.O.
Chairman

Defense policy on commissions

► Section 201(g) of the Army-Navy-Public Health Service Medical Officer Procurement Act of 1947, as amended by the Act of July 24, 1956, providing for commissioning of doctors of osteopathy in the Medical Corps of the Armed Services, calls for implementary regulations by the Secretary of Defense and then by the Secretaries of the three Services.

Below is a copy of the implementary regulations prescribed by the Secretary of Defense, as published in the Federal Register of November 9, 1956. Of the six requirements of the Defense Regulations, the first three are taken verbatim from the law and the remaining three are superimposed.

Full activation of the law awaits implementary regulations by the Secretaries of the three Services, in consonance with these Regulations of the Secretary of Defense.

FEDERAL REGISTER
Volume 21, Number 219
Washington, Friday, November 9, 1956
TITLE 32—NATIONAL DEFENSE
Chapter I—Office of the Secretary of Defense
Subchapter C—Military Personnel
Part 58—APPOINTMENT OF DOCTORS OF OSTEOPATHY AS MEDICAL OFFICERS
Sec.
58.1 Purpose.
58.2 Policy.

AUTHORITY: Sections 58.1 and 58.2 issued under 70 Stat. 608.

Sec. 58.1 Purpose. The purpose of this part is to implement the provisions of Public Law 763, 84th Congress (70 Stat. 608), relating to the appointment of doctors of osteopathy as medical officers.

Sec. 58.2 Policy. In the interest of obtaining maximum uniformity, the following criteria are established for the appointment of doctors of osteopathy as medical officers.

(a) To be eligible for appointment as Medical Corps officers in the Army and Navy or designated as medical officers in the Air Force, a doctor of osteopathy must:

(1) Be a citizen of the United States;

(2) Be a graduate of a college of osteopathy whose graduates are eligible for licensure to practice medicine or surgery in a majority of the States, and be licensed to practice medicine, surgery, or osteopathy in one of the States or Territories of the United States or in the District of Columbia;

(3) Possess such qualifications as the Secretary concerned may prescribe for his service, after considering the recommendations for such appointment by the Surgeon General of the Army or the Air Force or the Chief of the Bureau of Medicine and Surgery of the Navy;

(4) Have completed a minimum of (3) years college work prior to entrance into a college of osteopathy;

(5) Have completed a four-year course with a degree of Doctor of Osteopathy from a school of osteopathy approved by the American Osteopathic Association; and

(6) Have had subsequent to graduation from an approved school of osteopathy 12 months or more of intern or residency training approved by the American Osteopathic Association.

E. H. CUSHING, M.D.
Deputy Assistant Secretary of Defense
(Health and Medical).

[F. R. Doc. 56-9157; Filed, Nov. 8, 1956; 8:45 a.m.]

Uniformed Services' dependents' medical care

► Defense Regulations implementing the Dependents' Medical Care Act of June 7, 1956 (Public Law 569), effective December 7, 1956, were published in the November 8, 1956, issue of the *Federal Register*. The program, popularly known as Medicare, provides for use of civilian facilities for hospitalization and related medical care only of the spouses and dependent children of active-duty members of the uniformed services who do not have access to Government medical facilities.

The program in essence depends on hospitalization (normal outpatient care is excluded) and is restricted to unlimited prac-

titioners and hospitals staffed by unlimited practitioners. Note the definitions of "physician" and hospital" in the Regulations.

The Act calls for negotiation of contracts for civilian services, and the Army is Executive Agent for the purpose. In view of involved record-keeping, claim processing, and fiscal operations, and the above-mentioned definitions of "physician" and "hospital," the Government at this stage felt it expedient to let only one contract for professional or hospital services, as the case may be, for a given geographical area. In other words, a contractor for a given geographical area has to assume responsibility for processing the bills of both M.D.'s and D.O.'s for professional services or for medical and osteopathic hospitals, as the case may be.

Private insurance companies are contracting to handle hospital bills in North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Missouri, Arkansas, Louisiana, Wisconsin, Illinois, Indiana, South Carolina, Georgia, and Florida. In the remaining states, Blue Cross is the expected contractor. Each such contractor agrees to provide all hospitals (as defined in the Regulations) within the geographical area of the contract with adequate information.

The State medical societies are contracting (1) to encourage physicians (as defined in the Regulations) to participate, and (2) to maintain committees, where required, to review complaints. Where such committees have no cognizance of the subject matter or jurisdiction over the physician involved, the matter will be forwarded to the Government for consideration. In the same contract, Blue Shield undertakes to supply physicians (as defined in the Regulations) with current information to process and pay physicians' bills, and to render monthly invoices and provide budgetary, statistical, or processing cost information to the Government. The same fee schedules will apply to M.D.'s and D.O.'s. Contracts are for December 7, 1956, to June 30, 1957, subject to renegotiation.

DEPARTMENT OF PUBLIC AFFAIRS

DONALD M. DONISTHORPE, D.O.
Chairman

Bureau of Public Education on Health

ROSWELL P. BATES, D.O.
Chairman

The voluntary regulation of professional specialty practice

► For the most part the public is unaware of the extent to which the recognized healing art professions have gone to insure safe and adequate care for their patients. Licensing laws alone, generally speaking, determine only the educational qualifications and minimum ability of applicants for licensure as physicians and surgeons. The laws are gauged to the knowledge and ability that should be possessed by a physician and surgeon when he graduates from his professional college. After the physician has been licensed, the licensing law generally will affect him only if he engages in unprofessional or unethical practice.

Once the physician has been licensed in the osteopathic profession, it is the national and state osteopathic associations and affiliated specialty organizations that guide and influence his further professional development. Postgraduate educational programs keep the general practitioner abreast of new developments in practice. In a few states annual refresher training is required by law. When the practitioner turns to specialization in any of the fields of osteopathic medicine and surgery, it is the standards and requirements of the Boards of Certification established by the American Osteopathic Association to which he must look for leadership and direction. Since the licensing laws have no provisions relating to the practice of specialties, the voluntary programs of the Boards of Certification become applicable.

These Boards of Certification in Dermatology and Syphilology, Internal Medicine, Neurology and Psychiatry, Obstetrics and Gynecology, Ophthalmology and Otorhinolaryngology, Pathology, Pediatrics, Physical Medicine and Rehabilitation, Proctology, Radiology, and Surgery operate under established professional specialty requirements and standards. All eleven of the Boards in the osteopathic profession are subject to the supervision and control of the Advisory Board for Osteopathic Specialists and the Board of Trustees of the American Osteopathic Association. The standards and requirements demand special study, training, and knowledge in the specialty fields. To achieve certification by the American Osteopathic Board of Surgery, for example, a physician must have had a minimum of 7 years of professional practice and have completed an internship and a minimum of 3 years of formal training subsequent to internship. During his period of formal training the licensed physician must have assisted in the performance of not less than 400 major surgical operations. He must have practiced as a specialist in surgery for 2 years subsequent to the completion of his 3 years of formal training, and during this period he must have performed not less than 200 major surgical operations upon his own responsibility. These are only a part of the basic requirements, but they evidence the stringency with which the osteopathic profession has approached the subject of specialty practice in surgery. Much more could be said about the standards for registered and intern-training hospitals administered by the Bureau of Hospitals. There are, in addition, further voluntary requirements of hospital staff bylaws and rules and regulations in regard to the furnishing of medical and surgical care in such institutions.

The fundamental significance of these facts is that the osteopathic profession and its organizations and institutions have gone far beyond the standards of state licensing laws, either medical or osteopathic, in seeking to accomplish their objectives of providing competent and effective health care. In no state law applicable to doctors of medicine is there a requirement that a doctor of medicine have any professional postgraduate training beyond an internship. Yet every doctor of medicine is licensed to practice unrestricted and unlimited medicine and surgery, and the same can be said concerning all but a small percentage of doctors of osteopathy. The public and governmental officials in most states recognize that the specialty and hospital requirements of the medical and osteopathic professions more than adequately insure high standards of care from physicians and surgeons.

Current Literature

An evaluation of peripheral arteriosclerotic insufficiency utilizing radioactive iodinated human serum albumin

► THE USE OF radioactive iodinated human serum albumin as a means of studying peripheral circulation and of evaluating the effect of various therapeutic measures on the status of circulation has been explored by Earl J. Halligan, M.D., and coworkers. A preliminary report of a study of the lower extremities of 75 patients appears in the May 1956 issue of *Surgery, Gynecology and Obstetrics.*

With the patient in a recumbent position, the face of a lead-shielded scintillation counter is placed in contact with the medial malleolus, and 40 microcuries of radioactive iodinated human serum albumin, 1 cc. in volume, are injected into an antecubital vein. An Esterline Angus plus count rate meter apparatus is used to record the counts per minute graphically. After a time of equilibrium has been established, the number of counts is ascertained for 1-minute periods. Counts are taken over the ankle, calf, and thigh and compared to readings taken over the region of the femoral artery near the inguinal ligament. Counts are then converted to percentages because actual counts do not allow for variations in size, body build, and differences of circulation between extremities.

The seventy-five patients in this series were arranged into four groups according to the seriousness of circulatory impairment. Control studies of normal patients provided the basis for comparison.

As a result of this study, the following conclusions were reached:

1. This is the most accurate method currently available for evaluating the circulation.
2. The technic is safe and fairly simple and may be repeated for diagnostic as well as prognostic purposes.
3. The circulation of an extremity may be more efficiently determined by analyzing the circulation index, the build-up curve, and the ankle-to-femoral ratio.
4. The procedure shows promise as a means of studying the reserve vascular bed and of ways to alter it, such as intra-arterial medications and lumbar sympathectomy.
5. Studies with this procedure indicate that vasodilator drugs may be continued after sympathectomy.
6. The use of sympathectomy in persons with arteriosclerosis obliterans should be limited to those patients with moderate disease, embolism, and vasospastic conditions.

Uterine retrodisplacement: etiology and management

► WITH THE DECLINE in popularity of surgical procedures for the correction of uterine retrodisplacement, the use of vaginal pessaries is receiving more consideration in the treatment of certain patients. A summarization of the etiology and management of uterine retrodisplacement and a suggested therapeutic procedure are given in the August 1956 issue of *Postgraduate Medicine* by Robert W. Kistner, M.D., and Christopher J. Duncan, M.D.

Congenitally deficient fibromuscular supporting structures and/or a short anterior vaginal wall are primary factors in uterine retrodisplacement. Childbirth, pelvic infection, endometriosis, and tumors can cause secondary retrodisplacement and its associated ligamentous relaxation. Regardless of cause, retrodisplacement results in torsion and partial venous obstruction brought about by the distorted angle of the entrance and exit of the uterine vessels. Ovaries and tubes are drawn into an attiude of pelvic wall prolapse, and pressure in the veins of the infundibulopelvic ligament is increased.

Frequently, retroversion causes no symptoms at all; when symptoms are present, sacral backache is the most common complaint. Pelvic pressure or a "bearing down" feeling are also frequently mentioned by many women. About half the patients presenting symptomatic retrodisplacement note that the symptoms are aggravated just before or during the menstrual period.

The ease with which the retroverted uterus may be replaced is usually determined at the time of pelvic examination. Pelvic infections, tumors, or endometriosis should be corrected prior to replacement. Likewise, a course of pelvic depletion for 3 or 4 weeks is recommended for patients with a soft and boggy uterus. At the end of this time, simple manual manipulation is often sufficient to reposition the uterus, although occasionally the tenaculum method is required. If these technics prove unsuccessful, correct positioning may be obtained by inserting a pessary (Smith-Hodge or Hodge hard rubber). The pessary is kept in place 5 to 6 months. The patient is examined monthly during this period; at which examination the pessary is removed and replaced. At the end of the 5- or 6-month period, the pessary is removed and the patient observed for 2 more months.

If the retroversion recurs, retreatment may be tried. Occasionally uterine suspension may be considered, but rarely as a primary surgical procedure.

The patients most helped by the use of a pessary are those women presenting "married woman's complaint": backache, heaviness in the pelvis, aching thighs, vaginal discharge, chronic fatigue, and dyspareunia. These women usually are hard-working housewives with one or more children under 4 years of age.

Treatment of checkrein shoulder by use of manipulation and cortisone

► IN THE JUNE 30, 1956 issue of *The Journal of the American Medical Association,* Thomas B. Quigley, M.D., describes the study of fifty cases of checkrein shoulder in forty-seven patients and treatment by means of manipulation under light anesthesia followed by injections of cortisone to lessen postmanipulation pain.

Checkrein shoulder is differentiated from other types of frozen shoulder by a history, in a middle-aged patient, of disuse (with or without an initiating cause); by gradual return of joint movement limited to the lower ranges of motion, with a painful check to the upper ranges; by resistance to ordinary therapy; by findings of limited passive abduction and rotation; by x-ray findings of demineralization from disuse with calcification deposits seen in 20 per cent of patients; and by a palpable and audible release of resistance during manipulation under anesthesia.

The etiology of the syndrome is not clear. Disuse seems to be the only factor common to all cases and is frequently, although not always, imposed by pain. An adequate explanation of the sequence of events would seem to be: dependency and disuse produces edema, and edema in time causes stiffness.

The anatomic abnormality of frozen shoulder has been described as an adherence of the anterior-inferior folds of the joint capsules to each other and to the adjacent glenoid and

humerus. Because only the anterior and inferior aspects are involved in a checkrein contracture, the term "checkrein shoulder" has been devised.

Treatment without manipulation, while effective, can be a long, slow, arduous process. However, manipulation with the patient under anesthesia has long been considered by many to be dangerous and useless. Postmanipulation pain is usually so severe that active motion is difficult or impossible. Before the pain has subsided, adhesions and contractures may re-form, and motion may be more limited than before manipulation. However, with the introduction of corticotropin or cortisone following manipulation, it has been possible to suppress pain successfully.

In the early cases in this series, corticotropin was given parenterally. In the last thirty cases the following procedure was followed: (1) The patient was hospitalized; (2) tests were made to determine contraindications to the use of cortisone; (3) if no contraindications were found, the patient received cortisone orally for 2 days; (4) manipulation was carried out with the patient under light thiopentalnitrous oxide anesthesia; (5) following manipulation, a mixture of procaine, hyaluronidase, and hydrocortisone acetate was injected either into a hematoma at the site of rupture of the checkrein or directly into the shoulder joint; (6) oral doses of cortisone were given daily for 3 days followed by 3 days of tapering doses; and (7) physical therapy was begun immediately and an exercise program was outlined for the patient to follow at home.

Fifty-two manipulations of fifty frozen shoulders were performed on 47 patients over a 5-year period. Oral cortisone, parenteral corticotropin (ACTH), and/or local injection of hydrocortisone acetate and hyaluronidase effectively suppressed postmanipulation pain in every instance. Of the forty-four definite checkrein shoulders, thirty-three promptly regained a normal painless range of motion while eleven were improved but retained some degree of pain and/or restriction of motion. Six frozen shoulders which did not fulfill the criteria for checkrein shoulder were unimproved; in one, manipulation resulted in a fracture of the anatomic neck of the humerus.

The treatment of resistant dermatoses with pantho-F

▶ THE VALUE OF topical steroid therapy in dermatologic diseases is discussed in the August 1956 issue of *The Connecticut State Medical Journal* by Louis O'Brasky, M.D. In the series described, hydrocortisone in a pantothenylol base (Panto-F) was used.

Because approximately 20 per cent of the general practitioner's patients and 30 per cent of the pediatrician's patients suffer from some form of skin disease, it is important that every method for increasing the speed and effectiveness of dermatologic therapy be utilized. The dermatologic value of topical steroid therapy has been established. In this study of 132 patients, hydrocortisone in a cream base containing pantothenylol was used to evaluate any additional benefit which might be derived from the medication beyond that resulting from the steroid.

The procedure in this study was to remove any traces of previous medication by use of a saturated solution of boric acid in the form of a compress. After drying the diseased area, the patient was asked to apply a thin layer of Pantho-F cream twice daily whenever possible. Morning and evening applications were suggested. The use of a dressing kept in place by adhesive tape was discouraged. In those instances in which the disease affected the hands, the patient was instructed to wear lisle or cotton gloves during sleep.

The following results were obtained: The 40 cases of contact dermatitis (including 15 cases of housewife's dermatitis) responded excellently to therapy. All 24 cases of seborrheic dermatitis responded well. The 11 cases of nummular eczema showed a less dramatic response; nevertheless, results were better than those obtained with older types of therapy. Some cases of varicose eczema responded well, while in others the response was not so good. Only the localized forms of atopic dermatitis did well under therapy. When the condition was generalized, the response was discouraging. All six cases of pruritus ani improved with startling rapidity. In the seven cases of eczematoid epidermophytosis, however, only the eczema was improved. Fungicidal remedies were required to check the primary infection. In herpes zoster, the pain and itching responded well, but the cutaneous lesions ran their normal course. Disappointing results were obtained in the cases of herpes simplex and infantile eczema.

Melanoma-simulating nodules due to capillary aneurysms

▶ BECAUSE OF THE seriousness of malignant melanoma, any flat, black, smooth, hairless, growing nodule on the skin is usually considered an indication for immediate surgical intervention. Not every such nodule is malignant, however, and Ervin Epstein, M.D., and his coworkers, writing in the July 1956 issue of *California Medicine*, decry the wanton sacrifice of normal tissue without histologic proof or indisputable clinical evidence of malignancy. To illustrate their point, they present six cases in which nodules clinically simulating melanoma was found to be caused by an aneurysmal dilatation of a capillary with thrombosis.

Other lesions which present features similar to melanoma include blue nevus, junction nevus, pigmented basal-cell epithelioma, melanotic freckle, epithelial and sebaceous cysts, granuloma pyogenicum, glomus tumors, hemangiomas, hemorrhages, fibroangiomas, and angiosarcomas. Actually, benign conditions are seen more often than are malignant lesions.

The common criteria of malignancy include growth, bleeding, metastasis, ulceration, and deepening color. Although metastasis and ulceration have not been reported in cases of aneurysms, rapid growth is common, and bleeding and deepening of color also may occur. Therefore, clinical differentiation is often difficult.

A conservative excisional biopsy is recommended in lesions suspected of being melanoma. These aneurysms are small. If the diagnosis of melanoma is confirmed, more radical surgery can then be performed. If the tumor is benign, the patient can be cured without deleterious cosmetic results.

Diagnosis and treatment of carcinoma of the prostate

▶ BECAUSE CARCINOMA of the prostate is a disease of old age, increased life expectancy has meant that many more cases of this disease are now being seen. Unfortunately, diagnosis of early carcinoma, which can be cured by radical operation, is not much improved. For this reason, Edwin P. Alyea, M.D., and Earl P. Galleher, Jr., M.D., writing in the July 1956 issue of *Postgraduate Medicine*, stress the importance of careful rectal examination of all older men by the general practitioner in order to detect early evidence of a malignant lesion.

Among the factors hindering early diagnosis of malignancy are: (1) The growth of the tumor is slow and urinary symptoms do not appear until rather late; (2) the lesion usually starts in the posterior lobe, farthest away from the urethra; and (3) it is often masked by associated benign prostatic hypertrophy.

On the other hand, diagnosis and therapy of advanced inoperable carcinoma of the prostate have improved greatly during the past 15 years.

Evidence of metastasis is found most frequently in the pelvic lymph nodes and in the lumbar segment of the spinal column or in the bones of the pelvis, although it may also occur throughout the bony skeleton. Secondary anemia and bone marrow metastasis are also not infrequent findings. In instances in which the clinical diagnosis may be questionable, bone marrow studies can be of considerable help. They can also be useful in determining the effectiveness of hormonal therapy.

Cytologic examination of the prostatic secretion by the method of Papanicolaou is not recommended by the authors.

It has been suggested that there may be some relationship between prostatic cancer and phosphatases. An increase in serum alkaline phosphatase may be of assistance in indicating osteoblastic response to an invading carcinoma and thereby may be an index of such activity. The value for the serum acid phosphatase may be used as an index of the activity of the prostatic epithelium and, hence, another index of the activity of prostatic carcinoma. Simple invasion of the prostate is not believed to be sufficient to cause a significant increase in the serum acid phosphatase, however; extension beyond the capsule is necessary for this increase. In most instances of metastasizing carcinoma of the prostate, the serum acid phosphatase values have paralleled the general course of the disease, even in the absence of x-ray verification.

Radical perineal prostatectomy is regaining favor as the treatment of choice for early carcinoma of the prostate. In instances where the disease is too far advanced for radical operation, orchiectomy plus hormonal therapy is indicated.

Estrogen is usually the hormone of choice. However, many tumors which at first respond to administration of estrogen later become resistant to this hormone, and extragonadal androgen then stimulates the growth of the tumor and causes further spread. Means must then be taken to control the secretion of the extragonadal androgen.

The use of diethylstilbestrol following orchiectomy has been found effective, particularly in cases in which metastasis has not occurred. Other synthetic estrogens are being used experimentally. Tace, particularly, has proved beneficial in cases in which the tumor is resistant to stilbestrol.

High voltage x-ray therapy and the introduction of radium or radon seeds directly into the involved gland have proved effective in many cases. Hormonal therapy, however, remains the treatment of choice.

At the present time, attention is being centered upon the treatment of the androgenic-independent tumor or toward the patient with remission who has become resistant to estrogenic therapy.

Care of the bladder in neurological disorders

▶ ONE OF THE most common complications of neurologic disorders is disturbance of micturition. The importance of suitable care of vesical dysfunction is stressed by Herbert S. Talbot, M.D., in the July 7, 1956 issue of *The Journal of the American Medical Association*, and a program of proper management is outlined.

Bladder dysfunction may be due to involvement of the innervation of the bladder, to a disturbed state of consciousness, or to previously asymptomatic bladder lesions. Whether the initial cause is structural or functional is of little matter, however, because the relationship between the two is so intimate that a disturbance of one provokes a prompt reciprocal change in the other. Primary neurogenic vesical dysfunction may eventually lead to irreversible anatomic alterations, hence the necessity for avoidance or correction of these secondary changes.

Symptomatology of vesical dysfunction is related to the extent, location, and duration of the nervous lesion rather than to any pathologic processes associated with a specific disease. In order to understand any vesical dysfunction, the following should be determined: (1) the amount of residual urine, (2) the bladder's activity, (3) whether control or sensation has been damaged, (4) the existence of obstruction in the male or perineal relaxation in the female, and (5) whether there is evidence of infection. Diagnostic procedures include urinalysis and culture, residual urine determination, observation of voiding habits (frequency and amount), observation of the urinary stream, rectal and pelvic examinations, and neurologic examination.

Bladder disturbances are frequently seen following cerebrovascular accidents. Retention may develop while the patient is unconscious, but seldom continues after the patient has regained consciousness, except in men with associated obstruction. Continued drainage is usually the early treatment of choice, followed by habit training.

Incontinence, especially in the conscious patient, is a more common occurrence following cerebrovascular lesions. In these instances, incontinence is usually the result of a disturbed state of consciousness rather than involvement of the centers affecting micturition. Habit training is the best approach in these cases. Catheterization should be used only as a last resort.

The most important neurogenic bladder dysfunctions are those associated with disease of the spinal cord, such as multiple sclerosis, tabes dorsalis, diabetic and arteriosclerotic neuropathies, and acute combined degeneration of the spinal cord. Nor should the paralytic stage of poliomyelitis be overlooked, as urinary retention is not uncommon at this time.

Management technics include catheterization, periodic drainage, the use of parasympatholytic drugs such as atropine, and habit training. Such management is certainly within the capabilities of the physician who is charged with the general care of the patient.

Functional disorders of the gastrointestinal tract

▶ DURING THE PAST 50 years there has been a tremendous shift from the organic to the functional cause of disease according to Dwight L. Wilbur, M.D., writing in the March 1956 issue of *The Medical Clinics of North America*. This change is due largely to the psychologic stresses inherent in a change from rural to urban living and to a fear of mass destruction.

Functional disturbances are seen most often in the nervous and cardiovascular systems and in the gastrointestinal tract. Altered function may result from organic disease, irritation, allergens, or from chemical, physical or emotional stimulation. Emotional upset is frequently reflected in gastrointestinal disturbance, producing not only symptoms but causing major changes in the motor, secretory, and vascular functions of the gastrointestinal tract.

Because functional gastrointestinal disorder may result in a wide variety of clinical symptoms and may simulate organic disease, the diagnosis of gastrointestinal functional disease depends primarily upon recognition of certain positive characteristics. These include: (1) symptoms typical of functional disturbance, such as globus, aerophagia, hysterical bloating, or functional vomiting; (2) long duration of symptoms without significant detriment to general health; (3) nonconformation to the pattern of any recognizable organic disease; (4) bizarre timing of symptoms; (5) continuation of symptoms over a long period; (6) disappearance of symptoms during the night; (7) unusual pain patterns; and (8) the presence of burning pain, particularly of constant duration. These positive features, especially when seen in a nervous, anxious, or otherwise emotionally disturbed patient who displays no evidence of organic disease upon careful examination, usually indicate a functional gastrointestinal disorder.

In managing functional gastrointestinal disturbances, emphasis should be placed upon treating the patient and not upon treating the disease. Successful management depends upon an accurate diagnosis adequately and convincingly explained to the patient, the improvement or alleviation of symptoms, and the prevention or adequate control of relapse.

Psychotherapy is the keystone to improving or relieving symptoms. Sometimes the services of a psychiatrist are needed. More often, however, the understanding general practitioner can deal with the situation by establishing rapport with the patient and by helping him find a better way to meet a life situation. The use of diets, drugs, and other general and specific measures should be undertaken as required.

Gastrointestinal symptoms may recur whenever the patient's tolerance for tension is exceeded. However, if he is taught to avoid anxiety-causing situations and if he learns simple dietary and therapeutic measures for dealing with his symptoms, the patient with functional gastrointestinal disturbance can be expected to recover or, at least, to improve. For some, even a little improvement is enough to make life worth living again.

BOOK REVIEWS

▶ DERMATOLOGY. By Donald M. Pillsbury, M.A., D.Sc. (Hon.), M.D., Professor and Director of Department of Dermatology, University of Pennsylvania School of Medicine; Onetime Chairman, Subcommittee on the Cutaneous System and Member of Committee on Medicine and Surgery, National Research Council; Member of National Advisory Health Council, United States Public Health Service; Director, Commission on Cutaneous Diseases, Armed Forces Epidemiological Board; Walter B. Shelley, M.D., Ph.D., Associate Professor of Dermatology, University of Pennsylvania School of Medicine; Chief of Dermatology Clinic, Hospital of the University of Pennsylvania; Member, Subcommittee on the Cutaneous System, National Research Council; Area Consultant, Dermatology, Veterans Administration; and Albert M. Kligman, M.D., Ph.D., Associate Professor of Dermatology, University of Pennsylvania School of Medicine; Associate Professor of Dermatology, University of Pennsylvania Graduate School of Medicine. Cloth. Pp. 1331, with illustrations. Price $20.00. W. B. Saunders Company, West Washington Square, Philadelphia 5, 1956.

That this text will shortly be the most used text in dermatology and will continue so for years to come is the prediction of the reviewers. This prediction stems from enthusiasm about its many new and original aspects. The first portion of the book is devoted to the anatomy and physiology of skin, thus making it ideal for the beginning dermatologist. In fact, the discussion of the basic principles of dermatology take up the first 345 pages of the text; this illustrates the degree of completeness of the approach to the fundamentals of this phase of practice.

The pictures are excellent, refreshing, and numerous. The book is not cluttered with the references and other authors' opinions, that so frequently serve only as interruptions in reading. The clear statement of facts, making exceedingly interesting and easy reading, is readily understandable by junior and senior professional school students, yet the coverage is complete and in detail. The approach to etiologic problems of the controversial diseases of atopic dermatitis, seborrheic dermatitis, stasis dermatitis, and many others is often in the form of diagrams, showing the many contributing factors and their relationship. This original approach certainly does much to clarify and coordinate thinking for students and might often be a help in explaining by demonstration to intelligent patients.

The problem of chronic contact eczematoid dermatoses is correlated exceptionally well, particularly in the demonstrative chart along with the readily understandable interpretations given by the authors. The explanation of infectious eczematoid dermatoses of the feet is enlightening. It would be well for every man in general practice who meets this common dermatosis, so often misdiagnosed as "athlete's foot," to read this section.

The absence of comment on the pathology of each disease does not in any way detract from this text as a source of clinical information.

Without fear of overenthusiasm, the reviewers recommend this book with a blanket statement, "It should be in every physician's office."

A. P. Ulbrich, D.O.
D. Koprince, D.O.

▶ SURGICAL DIAGNOSIS. By Philip Thorek, M.D., F.A.C.S., F.I.C.S., Professor of Surgery, Cook County Graduate School of Medicine; Clinical Associate Professor of Surgery, University of Illinois College of Medicine; Diplomate of the American Board of Surgery; Co-Surgeon in Chief of the American Hospital; Attending Surgeon of the Cook County Hospital, Senior Attending Surgeon, Alexian Brothers Hospital; Member of American Association of Anatomists, Fellow of the American College of Chest Physicians. Cloth. Pp. 320, with illustrations. Price $12.00. J. B. Lippincott Company, East Washington Square, Philadelphia 5, 1956.

A brief presentation of the salient points necessary for the medical student, the intern, and the resident to know about surgical diagnosis is clearly presented. The book treats of the anatomy, physiology, abnormalities, and pathologic states of the head, the oral cavity, and neck; the chest and the organs within it; the breast; the esophagogastrointestinal tract; the liver, gallbladder, and bile ducts; the pancreas and the spleen; the abdominal and pelvic cavities and their contents. Special chapters are devoted to hernias and to surgical problems that arise in the hand and in the leg.

The excellently prepared, comprehensive index of the subject matter covered in the text is a joy to behold, for it makes this volume an easily accessible source of reference to a wide range of problems that confront the general surgeon. The illustrations, whether drawings or reproductions of roentgen studies, are eminently clear and helpful. Tables to aid the diagnostician in problems involving the differentiation of disease entities are incorporated whenever the need for them arises. The teaching surgeon will find it a highly useful guide in the presentation of his material to students. Students, on the other hand, will find it an invaluable tool in reviewing for various examinations. To put it briefly, a highly respected professor of surgery has successfully telescoped a vast amount of surgical information into readable capsules, each with its distinguishing heading. Not to be overlooked is the author's recommended approach to the investigation of a medical problem; his plan of work, concise and effective, is presented in the preface.

▶ OBSTETRICAL ROENTGENOLOGY. By Robert Berman, M.D., F.A.C.S., Assistant Clinical Professor of Obstetrics and Gynecology, New York University College of Medicine, New York; Attending Obstetrician and Rotating Director of Obstetrics and Gynecology, Beth Israel Hospital, Newark, New Jersey; Associate in Roentgenology, Margaret Hague Maternity Hospital, Jersey City, New Jersey; Assistant Attending in Obstetrics and Gynecology, University Hospital, New York; Director of Sterility Clinic, University Hospital, New York; Consultant Obstetrician and Gynecologist, Irvington General Hospital, Irvington, New Jersey; Diplomate, American Board of Obstetrics and Gynecology. Cloth. Pp. 599, with illustrations. Price $12.50. F. A. Davis Company, 1914-16 Cherry St., Philadelphia 3, 1955.

The place of roentgenology in the examination of the obstetrical patient has been discussed before, both from the clinical viewpoint of the obstetrician and from the objective geometrical approach of the roentgenologist. This volume represents a fortunate compromise of these divergent approaches, for the author is a clinical obstetrician who is eminently qualified in the field of roentgenology. Its excellent orientation, therefore, makes this book valuable both in the classroom and in the library of the physician doing obstetrical pelvimetry.

"Obstetrical Roentgenology" is the second in a series of monographs to be edited by Dr. Claude E. Heaton. Practically every standard method of roentgen cepphalopelvimetry has been reviewed and appraised in well-written style. The pertinent technical aspects of pelvic mensuration are accurately presented. The volume is profusely illustrated, although few of the line drawings are original. The illustrative radiographs are not of uniformly good quality, many of them having required retouching. No doubt much detail was lost in the photographic transition.

Although the content of the book provides a much needed common source of information on cephalopelvimetry, the title implies material covering the entire field of obstetrical roentgenology. It is, therefore, disappointing to discover that twelve of the fifteen chapters are devoted primarily to pelvimetry, while such important subjects as the diagnosis of pregnancy, indications of fetal death, abruptio placentae, placenta praevia, placental localization, and fetal and maternal abnormalities are inadequately covered. The selection of a less comprehensive title would have satisfied this objection.

The reader will be particularly interested in the forthright

approach that Dr. Berman uses in discussing the indications and scope of obstetrical pelvimetry. In his preface, he states, "As an obstetrician, I was impressed with the fact that vaginal examination was often inadequate in evaluating the bony pelvis, and that disproportion frequently developed in cases which apparently had a normal pelvis." It is with refreshing frankness that the author discusses the controversial subject of routine pelvimetry in a subsequent chapter: ". . . it is believed that routine x-ray pelvimetry of all primiparae and selected multiparae is indicated if one wishes to evaluate the pelvis accurately." In a similar manner, Dr. Berman answers physicians who object to pelvimetry because of the additional financial burden it places on the patient: "If one considers the value of x-ray pelvimetry in comparison with the value derived from other routine procedures which are carried out as a part of the prenatal workup, it becomes evident that such expenditure is more than warranted." A significant statement, coming from a practicing obstetrician!

In his book, the author poses the problem of the proper selection of the best method of cephalopelvimetry. The principles and technic of many methods are discussed, and yet the reader is left in a quandary regarding a method of choice. The Caldwell-Moloy technic, preferred by the author, utilizes equipment that is not readily available on the present market. We must conclude that the answers to the questions raised in this volume can only be supplied by the individual preference of the reader as he appraises the exhaustive material on pelvimetry available to him in this source.

"Obstetrical Roentgenology" is an indispensable volume for those who desire a comprehensive analysis of cephalopelvimetric methods. There is still a need for a current text that embraces the entire field of the roentgenograph examination of the obstetrical patient.

CHARLES D. OGILVIE, D.O.

▶ OUTLINE OF ORTHOPAEDICS. By John Crawford Adams, M.D. (London), F.R.C.S. (England), Consultant Orthopaedic Surgeon, St. Mary's Hospital, London, General Hospital, Brighton, and St. Vincent's Orthopaedic Hospital, Pinner; Assistant Editor, Journal of Bone and Joint Surgery. Cloth. Pp. 423, with illustrations. Price $7.00. Williams & Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2, 1956.

Intended as an aid for physiotherapists and orthopedic nurses or for students studying for the qualifying examinations, this manual manages to give a concise, easily read survey while avoiding the bareness of a synopsis. It omits rarities, minimizes descriptions of operative technics, and relegates fractures to another volume. The author is convinced that proper clinical methods are basic to sound diagnosis. The book opens with a general history of orthopedics, which is followed by a general survey of orthopedic disorders and then by chapters on specific areas and ailments related to them. Maintaining his emphasis on clinical examination, the doctor begins each chapter with a list of special points in investigation of the area, a checklist of clinical examination procedure and a listing of the disorders to be discussed. The pathology, clinical features, diagnosis, causes, and prognosis as well as the treatment of each are then discussed. Well indexed and amply illustrated, this manual provides quick, accurate, and practical reference and knowledge for the student.

▶ DIAGNOSIS AND TREATMENT OF VASCULAR DISORDERS (ANGIOLOGY). Edited by Saul S. Samuels, A.M., M.D., F.A.C.A., F.A.C.C., Editor-in-chief, *Angiology;* Pres., Angiology Research Foundation; Director of Angiology and Attending Vascular Surgeon, Brooklyn Hebrew Home and Hospital for the Aged; Chief, Dept. of Peripheral Arterial Diseases, Stuyvesant Polyclinic Hospital, N.Y.; Fellow in Surgery, N.Y. Academy of Medicine; Formerly Chief of Vascular Clinic and Adjunct Att. Surgeon, Bellevue Hospital, N.Y.; Honorary Member, Cuban Soc. of Angiology; Consulting Vascular Surgeon, Long Beach Memorial Hospital, Long Beach, N.Y.; Pres., Am. College of Angiology. Cloth. Pp. 621, with illustrations. Price $16.00. The Williams and Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2, 1956.

It seems almost certain that angiology is destined to become a specialty in its own right, quite apart from cardiology. The enormous growth and development in recent years of new technics for diagnosis and treatment of vascular disorders has tended to make the field sufficiently complex and important to justify a physician's devoting his entire time and talents to it.

The present book covers the subject of peripheral vascular problems in considerable detail and does it well. The first portion of the text discusses the anatomy of the peripheral circulation, innervation of peripheral blood vessels, and physiology of sympathetic innervation of peripheral blood vessels as background material needed for a proper understanding and appreciation of the clinical material that follows. In the clinical portion of the book, chapters are devoted to examination of the patient and the technics of angiography before the specific vascular problems are themselves considered. The specific problems discussed include, among others, local cold injuries, gangrene of the extremities, Raynaud's disease and Raynaud's phenomenon, varicose veins, arterial injuries, endarteritis obliterans, embolism and thrombosis, the scalenus anticus syndrome, and chronic edema of the legs. There is a separate chapter devoted to anticoagulant therapy, and the book closes with a chapter on medical legal aspects of angiology.

The material found in the book was prepared by seventeen different authors besides the editor, who also wrote several of the chapters. There is, as is to be expected under these circumstances, some diversity of writing skills, but on the whole the book is well written and extensive use is made of well chosen, well reproduced illustrations. The book should be of interest to anyone working in the field of peripheral vascular diseases, whether full or part time.

▶ MANAGEMENT OF STROKES. By Keith W. Sheldon, M.D. Cloth. Pp. 134, with illustrations. Price $3.00. J. B. Lippincott Company, East Washington Square, Philadelphia 5, 1956.

Eye-catching cartoons and a semi-conversational approach make this small volume readable, but this approach does not seem detrimental to the informative purpose which is intended. The author attacks the complacency which attributes any set of similar symptoms to a single cause—in this case, the "stroke." Then, constructively, he sets in order a procedure for diagnosis and a few suggestions for therapy, from both "what to do" and "what not to do" aspects. A number of case histories, not all of which have happy endings, add authenticity to the discussion and serve to illustrate quite well the various etiologies and treatments. Almost nothing is said about rehabilitation, but the volume is not intended to be a complete treatment of the subject. The main burden of the work seems to be differential diagnosis.

▶ PRACTICE IN RADIOTHERAPY. Under the General Editorship of Sir Ernest Rock Carling, LL.D., F.R.C.S., F.R.C.P., F.F.R., Consulting Surgeon, Westminster Hospital; Chairman, International Commission on Radiological Protection; B. W. Windeyer, M.B., B.S., D.Sc., F.R.C.S., F.R.A.C.S., F.F.R., Professor of Radiology, University of London; Director, Meyerstein Institute of Radiotherapy, Middlesex Hospital; Consultant in Radiotherapy to the Royal Air Force; and D. W. Smithers, M.D., F.R.C.P., F.F.R., Professor of Radiotherapy, University of London; Director, Radiotherapy Department, Royal Cancer Hospital; Consultant in Radiotherapy to the Royal Navy. Cloth. Pp. 549, with illustrations. Price $20.00. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1955.

The advanced student of radiotherapy, or one who has special connection with that field, will find a near-complete guide for his interest in this text. It may be too technical for the general practitioner, and certainly presupposes a basic knowledge of the subject, but its excellence is self-evident when considered in terms of those for whom it is written.

The book is a collection of articles by various specialists, concerning the different characteristics, problems and results of radiotherapy. The major portion of the volume concerns actual clinical practice, giving both diagnosis and cure. Among the subjects treated are: Dosage and Measurements, Biophysical Basis (of radiation), Choice of Treatment, Methods of Radiotherapy, Safety and Protection, Work of the Radiographer, Treatment (in both malignant and non-malignant conditions), and Records and Presentation of Results.

The editors, themselves expert in the field of radiotherapy, freely admit to difference in opinion among the contributors to the volume, but felt that a broader aspect of the field at large

could be gained from these varying viewpoints, provided a bit of moderation was used in presenting them. The result, of course, is a much more accurate picture of the field as it presently exists than if a single bias were represented—or at least an accurate picture of the British viewpoints, since the scene of both contribution and publication is British.

An objective of the editors was to expand the presentation of a specialized subject, to meet the increased demands of a rapidly-growing field. It would seem that their careful effort has its own reward in seeing such a purpose accomplished.

▶ FUNCTIONAL OTOLOGY. The Practice of Audiology. By Morris F. Heller, M.D., Assistant Attending Otolaryngologist for Audiology, Chief of the Audiology Clinic, The Mount Sinai Hospital, New York; with Bernard M. Anderman, M.A., and Ellis E. Singer, M.A. Cloth. Pp. 225, with illustrations. Price $5.50. Springer Publishing Company, 44 E. 23rd St., New York 10, 1955.

The enormous developments in audio-communication and the increased general interest in problems of hearing are changing the practice of otology. This volume, therefore, is intended to coordinate in a concise and applicable manner the various aspects of audiology for physicians and nonspecialists alike.

Throughout the book the author stresses the relationship of the auditory functional examination to all other phases of examination and diagnosis. He covers extensively not only testing procedures, but also testing areas, equipment, and interpretation, with special emphasis on combinations of tests and their application. This broad concept is aimed at helping the otologist investigate the organic and psychologic causations of hearing loss and determine the rehabilitative requirements of the acoustically handicapped patient and how to meet them.

Since defective hearing is often connected with speech disorders, several chapters are devoted to such problems. An excellent chapter concerning hearing aids is also included. Indications for medical and surgical therapy are not included, since they are readily available elsewhere.

While typographical production of the volume is not as meticulous as might be desired, it should not detract from the value of the contents. The book points out the great promise for the alleviation of the handicap of deafness, and should be of great interest to anyone concerned with the field of functional otology.

▶ ETIOLOGY OF CHRONIC ALCOHOLISM. Edited by Oskar Diethelm, M.D., Professor of Psychiatry, Cornell University Medical College; Psychiatrist-in-Chief, The New York Hospital (Payne Whitney Psychiatric Clinic). Cloth. Pp. 229, with illustrations. Price $6.75. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1955.

Careful research must indeed have its reward, and it is no accident that the combined efforts of five distinguished persons for 5 years have produced in this new volume a monograph of real worth. The problem of chronic alcoholism is defined and considered on a broad biosocial basis, from the standpoints of psychiatry, internal medicine, social and cultural anthropology, psychology, and pharmacology.

This book does not claim to suggest therapy; its purpose is an informative one, and it speaks of problem and cause to interested persons from several fields. However, its well-stated experimental evidence should contribute much to the understanding of any physician.

▶ PEDIATRIC NURSING. By Gladys S. Benz, R.N., M.A., Chairman of the Department of Maternal and Child Nursing, State University of Iowa, College of Nursing. Formerly, Instructor Pediatric Nursing, Cincinnati Children's Hospital; Instructor Bellevue Schools of Nursing, New York City; Supervisor, St. Louis Children's Hospital; Head Nurse Sarah Morris Hospital (Children's Division of Michael Reese Hospital) Chicago; Head Nurse University Hospital, Minneapolis, Minnesota. Ed. 3. Cloth. Pp. 634, with illustrations. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1956.

The third edition of a standard text in pediatric nursing has been published, with few obvious changes from previous issues.

Sound professional knowledge and real human understanding are a rare combination of factors. Too often the learner is led through dusty annals of scientific information, texts in sociology, workshops in psychology—and then left to find motivation in editorials or in his own basic intellectual tone. The welding of the factors is entirely his own, and too often this operation is completely omitted.

Here is a text that combines these factors with some success. The nurse is encouraged to observe a triumvirate of qualities: understanding, skill, and wise human relations. The author need not apologize for having put aside the impartation of medical knowledge for the purpose of moralizing, for the knowledge is there in quite undiluted form.

Whether this text is used as learning material for the student or a reference for the professional nurse, it retains its value as a well-rounded approach to the art of pediatric nursing care.

▶ TRAINING THE BACKWARD CHILD. By Herta Loewy. Cloth. Pp. 166. Price $3.75. Philosophical Library, Publishers, 15 East 40th St., New York 16, 1956.

Herta Loewy conducts a school for retarded children in southwest London. This book was planned to give more details of the technics of their training than were given in her earlier book, "The Retarded Child." Based primarily on personal experience, it is neither sentimental nor clinical, but discusses in a personally sympathetic manner the training technics and practical concerns which can give retarded children as full a life as possible. The discussion of the problems caused in the family by a retarded child is honest; the descriptions of proved drills, exercises, and diets are explicit. A large selection of case studies further reveals the uniqueness of each child and the necessity for individual solution to his problems. Throughout, it is realistic but confidently hopeful in its approach. Although not a book to which a doctor would customarily refer, it would be a helpful book for the parents of a retarded child.

▶ TROPICAL MEDICINE FOR NURSES. By A. R. D. Adams and B. G. Maegraith, From the School of Tropical Medicine, Liverpool. Cloth. Pp. 314, with illustrations. Price $6.00. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1955.

This is not a book on nursing, so it may be held to aggravate what is said to be a current fault in nursing training—an endeavour to make good nurses into inferior doctors. With personal knowledge of what nurses, particularly nurses in isolated stations, have to contend with in the under-doctored tropics we accept this charge . . .

And so saying, Adams and Maegraith proceed to provide the tropical nurse with a text to prepare her, at least sketchily, to deal with various diseases she may encounter.

Though the text covers the intended purpose quite well, it may seem to be a bit too self-sufficient. A reference list would have been helpful for the promotion of study in specific areas. However, this volume, with its insect-proof cover, may well become indispensable in many an isolated nursing station.

▶ HUMAN PERSPIRATION. By Yas Kuno, M.D., Member of Japan Academy. Cloth. Pp. 416, with illustrations. Price $9.50. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1956.

The author has adroitly achieved his goal: ". . . an account of the present knowledge of perspiration." His and his colleague's 35 years of investigation and careful recording have produced a study of human perspiration characterized by data, graphs, and photographs comprehending an extensive range of phenomena. The author notes varying stages of sweat gland development and function in the human race, differentiates between mental and thermal sweating, discusses differences in the perspiration patterns of several races as well as between the sexes and between adults and children, and reports on sweating phenomena during physical exertion and exercise. Although the book primarily records his own laboratory observations, a list of selected references is included. Explanations of methods and instruments used in his study are given in an appendix. The book is indexed by proper names and by subject matter.